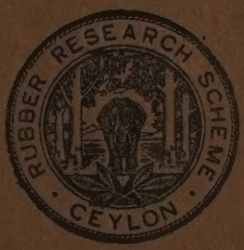
Vol. 21 Parts 1—4.

Rubber Research Scheme (Ceylon)

IMPERIAL MYCO. INST.
18 JUN 1945

Combined Quarterly Circulars for 1944



December, 1944

H. W. CAVE & CO., PRINTERS.

Rubber Research Scheme (Ceylon).

BOARD OF MANAGEMENT.

Chairman:

The Director of Agriculture, Mr. L. J. de S. Seneviratne, C.C.S.

Treasury Representative:

The Deputy Financial Secretary, Mr. C. E. Jones, C.C.S.

Unofficial Members of the State Council nominated by the Governor:

The Hon'ble Mr. George E. de Silva, M.S.C.
Mr. R. C. Kannangara, M.S.C.
Mr. G. R. Whitby, M.S.C.

Members nominated by the Ceylon Estates Proprietary Association:

Mr. W. H. Attfield
Mr. L. P. Gapp.

Members nominated by the Planters' Association of Ceylon:

Mr. F. H. Griffith, M.S.C.
Mr. R. C. L. Notley.

Members nominated by the Rubber Growers' Association:

Mr. R. J. Hartley
Mr. E. W. Whitelaw.

Members nominated by the Low-Country Products Association:

Mr. T. Amarasuriya, M.S.C.
Mr. W. N. Gunawardena, J.P.
Mr. J. L. D. Peiris
Mr. S. F. H. Perera

Members nominated by the Governor to represent Smallholders:

Mr. W. P. H. Dias, J.P.
Mr. F. A. Obeyesekere.

Experimental Committee:

Mr. F. H. Griffith, M.S.C. (Chairman)
Mr. W. P. H. Dias, J.P.
Mr. R. C. Kannangara, M.S.C.
Mr. F. A. Obeyesekere
Mr. S. F. H. Perera
Mr. T. E. H. O'Brien (Convener)

STAFF.

Director.—T. E. H. O'Brien, M.Sc. F.R.I.C., F.I.R.I.

Botanist (Temporary).—C. C. T. Sharp

Geneticist.—C. E. Ford, Ph. D. (Lond.), B.Sc. (Lond.)

Assistant Botanist.—C. A. de Silva, B.Sc. Agric. (Lond.), C.D.A. (Wye)

Soil Chemist.—L. A. Whelan, M.Sc. (N.Z.), Ph.D. (Aberd.), A.R.I.C.

Chemist.—M. W. Philpott, M.Sc., A.I.R.I.

Smallholdings Propaganda Officer.—W. I. Pieris, B.A. Hortic (Cantab.)

Estate Superintendent.—G. P. N. de Silva

Secretary-Accountant.—C. D. de Fonseka.

Office and Laboratories.—Dartonfield Estate, Agalawatta, Ceylon.

CONTENTS

ORIGINAL ARTICLES

Page

Field Experiments on Dartonfield Estate :—

XXIII.—Measurements of Growth in Replanted Areas (1944). By L. A. Whelan ... 3

XXIV.—Manuring Experiment with Mature Rubber (1943). By L. A. Whelan ... 6

XXV.—Comparison of Tapping Systems By C. A. de Silva 8

The Performance of Imported Clones in Ceylon—VI. By C. C. T. Sharp 15

Planting Material and Related Problems. By C. E. Ford 20

Ceylon Clones—X. By C. E. Ford 25

Experiments on the Control of Bark Rot. By C. E. Ford 29

MEETINGS

Minutes of the Sixty-Ninth, Seventieth, Seventy-First, Seventy-Second and Seventy-Third Meetings of the Rubber Research Board 34

NOTICES

DARTONFIELD ESTATE — VISITORS' DAYS

Owing to war-time conditions there will only be one Visitors Day at Dartonfield each month, namely, the *second Wednesday.* The services of technical officers will be available to visitors on that day; the estate superintendent will be available every Wednesday. Visitors are requested to arrive on the estate not later than 9-30 a.m.

Visitors will be welcomed at the station on other days provided an appointment has been made in advance.

Dartonfield Estate is situated about 3½ miles from the main Matugama-Agalawatta Road, the turn-off being near culvert No. 14/10. The distance from Colombo is approximately 47 miles.

PUBLICATIONS

Rubber Research Scheme publications comprising Annual Reports, Quarterly Circulars and occasional Bulletins and Advisory Circulars are available without charge to the Proprietors (resident in Ceylon), Superintendents and Local Agents of Rubber estates in Ceylon over 10 acres in extent. Forms of application for registration may be obtained from the Director. Extra copies of publications can be supplied to the Superintendents of large estates for the use of their assistants.

ADVISORY CIRCULARS

The undernoted Circulars may be obtained on application at 25 cents per copy. Future issues in the series will be sent free of charge to estates registered for the receipt of our publication —

(1) Notes on budgrafting procedure (revised June, 1943).
(2) Programme of manuring for replanted Rubber clearings (revised October, 1941).
(3) Notes on Rubber seedling nurseries. (Revised September, 1943.)
(4) Contour lining, holing and filling, cutting of platforms, trenches and drains (revised June, 1943).
(5) Straining box for latex (January, 1940).
(6) Notes on the care of budded trees of clone Tjirandji 1 with special reference to wind damage (September, 1938).
(8) Planting and after-care of budded stumps (revised June, 1943).
(10) Root disease in replanted areas (August, 1939).
(14) Rat Control (September, 1940).
(16) Increasing the crops from Ceylon Rubber estates (January, 1942) and two Supplements.
(17) Tapping young budded trees (May, 1942), and Supplement.
(18) Rubber manuring under wartime conditions. (November, 1942)
(19) Density of Planting and Thinning-out. (December, 1942).
(20) Planting material recommended for use (1944). (Revised May, 1944).
(21) The Control of Bark Rot and Canker. (April, 1944).
(22) Oidium Leaf Disease. (April, 1944) and two Supplements.
*(23) Uniformity in the Nomenclature of Clones and Clonal Seedlings. (December, 1944.)
*(24) Treatment of Brown Bast. (December, 1944.)

Due for issue shortly

FIELD EXPERIMENTS ON DARTONFIELD ESTATE.—XXIII

MEASUREMENTS OF GROWTH IN REPLANTED AREAS 1944)

L. A. WHELAN, *Soil Chemist.*

No. 2 Replanting Experiment 1938, 19½ Acres.
(Fertiliser Trial)

THIS area was replanted with budded stumps in 1938. The 1943 manures were applied in September at the following basic rates per tree: $N=P_2O_5=K_2O=5.5$ ozs. Girth measurements were made in June, 1944 and a summary is given below. As suitable trees had been taken into tapping in March all plot trees were measured at 4 feet in June and not at 3 feet as previously.

Mean Girth in Inches per Tree (at 4 feet)

O	N	P	K	NP	NK	PK	NPK	Compost	Mean
14.89	14.71	17.07	14.66	18.13	16.21	17.98	18.38	18.00	16.67

Standard error .681

Significant (odds 19:1) 1.97
difference (odds 99:1) 2.65

From the figures given above the following general responses are obtained for N, P and K:—

General Mean	Response to N	P	K
16.50	.71	2.77	.61

Significant (odds 19:1) .94
difference (odds 99.1) 1.27

The response to P is highly significant. The responses to N and K are not statistically significant.

Girth measurements at 3 feet were also taken in January 1944 and the increments for the preceding 6 months are given below:—

O	N	P	K	NP	NK	PK	NPK	Compost	Mean
1.66	1.59	1.74	1.34	2.12	1.81	1.76	2.12	1.92	1.78

The general responses to N, P and K are:—

General mean	Response to N	P	K
1.77	.28	34	—.02

Significant (odds 19:1) .20
difference (odds 99.1) .27

It is of interest to note that for the first time in this experiment (5½ years after planting), N has shown a significant response which is almost equal to that shown by P.

Bark Thickness.—Measurements of all plot trees were made in March, before the trees were marked out for tapping at two points 37 ins. above the union.

Bark Thickness in Millimetres

O	N	P	K	NP	NK	PK	NPK	Compost	Mean
5.7	5.5	6.1	5.5	6.0	5.	6.1	6.0	6.1	5 9

General Response to			Significant difference (odds 99:1)
N	P	K	
0.0	0.4	0.0	0.28

Phosphate has brought about a small but significant increase in bark, but N and K have had no effect. A high degree of correlation (+0.75) was found between girth and bark thickness, and the bark thickness figures corrected for variations in girth showed that the bark response was only a reflection of general growth improvement due to phosphate manuring.

Tapping.—All plots with an average girth of at least 17.5 ins. in January were taken into tapping in March. Trees of at least 18 ins. in these plots were tapped. A similar census was made in June and additional trees were taken into tapping in September. Cuts were opened at 36 ins. and tapping is on the S/2, d/2, 100% system. The number of tappable plot trees (18 ins.) per treatment in June, 1944 is expressed below as a percentage of the total plot trees per treatment.

O	N	P	K	NP	NK	PK	NPK	Compost	Mean
18.8	16.7	49.9	17.7	67.7	35.4	64.6	68 8	59 4	44.2%

The percentage of tappable trees for each clone was :—

TJ. 1:	PB. 183	W. 259	HC. 28	PB. 86	PB. 186	Mean
50.7	24.3	31.9	61.1	34.7	62 5	44 2%

Wintering.—On 24th and 25th January, 1944 observations were made on the progress of wintering.

Number of Trees Wintered
(as percentage of total trees per treatment)

O	N	P	K	NP	NK	PK	NPK	Compost
42	43	44	70	25	39	35	27	34%

The figures indicate that K tends to advance wintering, and NP and NPK to retard it. The NP plots of clones PB. 183 and PB. 86 did not winter this year.

Oidium.—The clearing suffered a sharp attack of Oidium early in the year, the plots most affected being NP, NPK and Compost. The incidence of the disease in this area appeared to depend almost entirely on whether refoliation occurred at a period when the disease was active. Manuring appeared to have led indirectly to increased Oidium owing to late wintering of the manured trees.

Results to date.—The series of measurements given in this paper mark the end of the first stage of this experiment, the effect of manures on the growth of young Rubber. Owing to the retarding effect of tapping on growth, and the taking into tapping of trees at different times, further girth measurements will be of limited value until this varying effect has been levelled up.

The results of this experiment indicate that phosphate is the most important requirement for young Rubber and that nitrogen may be of importance about the time that Rubber is of tappable size.

The general trend of the response to manures obtained in the Dartonfield experiment is supported by a series of similar experiments carried out

on estates in the Kurunegala, Kalutara and Kelani Valley districts. The mean responses from a 4-year period of experimental manuring were :—

Mean age	Mean girth	Response to N.	P.	K.
5 years	15.62 ins.	.35 ins.	.81 ins.	–.05 ins.

The indications are that phosphate is the chief requirement on average local soils, but on backward areas and for backward trees where the general growth is satisfactory an NPK mixture should be given.

No. 3 Replanting Experiment 1936, 9½ acres.

(Comparison of Methods of Opening, Planting, and Manuring)

Budded stumps and stumped buddings planted May, 1936. Seed-at-stake planted August-September, 1936, budded in field December, 1937 to April, 1938.

Experimental manures were last applied in October 1941, and in later years Saphos phosphate only. Girth measurements were taken in June, 1944 and a summary is given in Table I below. It should be recognised that at this stage of the experiment girth figures are of limited value owing to the retarding effect of tapping on growth. As might be expected, trees that have been the shortest time in tapping have shown the biggest girth increment for the year under review.

TABLE I
Mean Girth in Inches per Plant

	1943	1944	1943-1944 Increment
Methods of Opening :—			
(1) Platforms	21.68	23.71	2.03
(2) Trenches	20.79	22.82	2.03
(3) Pitted Drains	20.58	22.85	2.27
Standard error	.451	.510	.138
Significant difference (odds 19:1)			Not significant
Methods of Planting :—			
(1) Budded stumps	21.85	23.72	1.87
(2) Stumped buddings	23.33	25.26	1.93
(3) Field buddings	17.87	20.39	2.52
Standard error	.35	.36	.11
Significant difference (odds 99:1)	1.40	1.46	.45
Manuring :—			
(1) Organic	20.80	22.89	2.09
(2) Inorganic	21.24	23.36	2.12
Standard error	.151	.157	.069
Significant difference (odds 19:1)	.43	.46	Not significant

Methods of Opening.—No significant growth difference between the different methods of opening.

Methods of Planting.—The growth differences between the different methods of planting are stil highly significant eight years after planting.

Manuring.—The small significant difference of 0.5 in. in favour of the inorganic manure, noted last year, has been maintained.

Yields.—The yields for the period January-September 1944 expressed as grams per tree per tapping are given overleaf. Field buddings are excluded as many of the trees have not yet been taken into tapping

Yields in Grams per Tapping per Tree

Budded Stumps	Stumped Buddings	Pitted Platforms	Pitted Trenches	Pitted Drains	Organic	Inorganic
11.5	12.8	12.1	12.2	12,1	12.0	12,3

There are no yield differences between the different methods of opening or between organic and inorganic manures. The difference between stumped buddings and budded stumps is significant at odds of 19:1 and may be attributed to the greater girth of the former.

FIELD EXPERIMENTS ON DARTONFIELD ESTATE—XXIV

MANURING EXPERIMENT WITH MATURE RUBBER (1943)

L. A. WHELAN, *Soil Chemist*

MANURES were broadcast in March, 1943 at the basic rates of $N = P_2O_5 = K_2O = 0.8$ lb. per tree

Results

Mean Yield in Kilograms of Dry Rubber per Plot of 20 Trees

Figures in brackets refer to yields as percentages of yield from unmanured plots

Treatment	Adjusted Yields							Actual Yields
	Full Number of Tappings					One sample tapping per month		
	1937	1938	1939	1940	1941	1942	1943	1943
N	49 8(111)	56·9(114)	44·5(112)	44·6(111)	43·9(115)	8·22(117)	8·20(115)	8·25
NP	47 5(106)	52·9(106)	41·5(104)	42·0(104)	39·3(103)	7·37(105)	7·81(110)	7·73
NK	49 1(110)	56·5(113)	44·1(111)	44 6(111)	43·5(114)	8·42(120)	8·23(116)	8·53
NPK	49 6(111)	59·3(119)	46·6(117)	47·4(118)	42·1(110)	7·63(109)	8·42(118)	8·85
O	44 8(100)	50.0(100)	37·9(100)	40·3(100)	33·3(100)	7·00(100)	7·11(100)	6·41
Mean	48·2	55·1	43·3	43·8	41·4	7·73	7·95	7·95
Std. Error	1·2	1·8		1·5		·302	·304	
Sign. Diff. (odds 19:1)	3·5	5·3	Not Significant	4·3	Not Significant	·88	·88	

From January to April 1943, trees were tapped on the double-four system (2S/2, d/4, 100%) and for the remainder of the year on the double-three system (2S/2, d/3, 133%). Half of the area was tapped during the normal winter rest period (11th February to the 10th March) and half was rested, but this was arranged so as not to interfere with the experiment.

A significant response was shown to the N, NK and NPK treatments but, as in previous years, no response to NP. It will be noted that the plots receiving phosphate showed an apparent improvement in 1943 over the low yields given in the two previous years.

Effect of Tapping During Normal Resting Period.—Four sub-plots were rested and four were tapped. The adjusted mean yields for one tapping a month from the two series were :—

Rested	8.00 kilos per plot
Tapped	7.90 „ „

Leaving out of account the additional rubber obtained during the 28-day period, it is evident that tapping over the resting period has had no adverse effect on the yield for the remainder of the year.

Girth Increment.—Measurements were taken in January, 1944, and a summary is given below :—

Girth in Inches

Treatment	1937	1944	Increments 1937-1944	Number of Trees measured
N	35.72	37.42	1.70	157
NP	37.26	39.56	2.30	156
NK	39.12	40.84	1.72	158
NPK	37.25	39.56	2.31	154
O	33.81	35.44	1.63	160
Std. Error			.155	
Sign.) 19:1			.45	
Diff.) 99:1			.61	

NP and NPK have had a highly significant effect on girth. No response has been shown to N or NK. Although the responses to NP and NPK are statistically significant, the smallness of the values and the long period of time involved indicate that the manuring of trees 30 years old has little effect on growth.

Bark Renewal.—The thickness of renewed bark for the year ending January, 1944 is :—

N	NP	NK	NPK	O	Mean
6.1	6.3	6.2	6.4	6.0	6.2 mms.

NP and NPK appear to be slightly better than the other treatments but the differences are not statistically significant.

Cover Crop.—During 1943 leguminous covers were sparse, but in January, 1944 some improvement was noted and a survey was made.

Condition of Leguminous Cover

Treatment	Absent or very poor	Poor	Fair
N	3	5	0
NP	1	3	4
NK	4	3	1
NPK	0	2	6
O	4	4	0
Broadcast	4	11	5
Forked	8	6	6

The figures refer to the number of plots, and indicate the beneficial effect of phosphate and the lack of response to forking.

Wintering.—A count was made in January, 1941 of trees that had wintered and the number of such trees is given below for each treatment. The full number of trees for each treatment=160.

N	NP	NK	NKP	O
77	69	97	69	80

No particular accuracy is claimed for the figures, but they indicate that potash may lead to early wintering and phosphate to late wintering.

FIELD EXPERIMENTS ON DARTONFIELD ESTATE—XXV

COMPARISON OF TAPPING SYSTEMS

C. A. de SILVA, *Assistant Botanist.*

This paper presents the results for the seventh year of experimental tapping and sumarises the results for the first 6 years. A description of the experiment and previous comments on the various tapping systems will be found in the following publications:—

1. *Second Quarterly Circular for 1939,* (Vol. 16, Part 2).
2. *Third Quarterly Circular for 1940,* (Vol. 17, Part 3).
3. *Third Quarterly Circular for 1941,* (Vol. 18, Part 3).
4. *Combined Quarterly Circulars for 1942,* (Vol. 19, Parts 1-4).
5. *Combined Quarterly Circulars for 1943,* (Vol. 20, Parts 1-4).

Experimental Details

THE experiment is laid out in 6 randomised blocks in 2 fields planted in 1913 and 1917. The fields have been manured since 1937 under a biennial programme of manuring on the estate.

Results

The yields of the uniformity trial carried out in 1936 prior to the commencement of the experiment and the experimental yields for the tapping year 1943-44, are given in Table I in kilograms of dry rubber per plot of 30 trees. The table also includes the yields for 1943-44 adjusted for initial yields and scrap yields expressed as a percentage of total yields. Partial "wash-outs" are not included in the experimental results. An approximate estimate of yields per acre can be obtained by multiplying the figures in the table by 7.

Table II gives the adjusted yields of the tapping systems for the full period of seven years expressed as a percentage of the control system No. 1, (S/2, d/2, 2×6m/12, 100%). The results of the analysis of the cumulative yields carried out independently are given in the last column of this table, and since the year to year fluctuations in yield are smoothed out these figures afford the more reliable guide to the relative yields of the various tapping systems. In 1943/44 the yield of

the control plots (system 1) increased to 83.7 kilograms from 72.8 kg. in the previous year. This increase cannot be accounted for but it has had the effect of depressing the yields of the other tapping systems when expressed as a percentage of the control.

The differences in yield between the tapping systems of 67 per cent intensity are not significant and all show the beneficial effect of the periodic rest in yields considerably above those expected from the intensity of tapping. System No. 7, which is the half-spiral third-daily, is of particular interest in that it shows the highest dry rubber content figures for the seven years tapping (Table III). It has also given a relatively high proportion of scrap.

System No. 3, the half-spiral alternate-day on alternate sides shows a considreable drop in yield in 1943-44 and the increased yield of 9.3 per cent over 7 years' tapping fails to come up to the required significant standard. The yields in most years have been apparently better than those from "double four" system, but it has not the same advantage in tapping costs.

System No. 4, two quarter-cuts in echelon, tapped alternate-daily for some unaccountable reason started off in 1937 with a yield significantly below that of the control, but in recent years it has shown very satisfactory increased yields over the control. The initial opening of two quarter-cuts in echelon on old trees presents some practical difficulties, and the loss of time collecting latex from two quarter-cuts instead of one half-cut must be taken into account especially when a "wash-out" is imminent during wet weather.

System No. 5, the "double four" shows only an apparent increase of 6.8 per cent over the seven-year period but the general trend of the yields suggests that the system is capable of giving somewhat higher yields than the control alternate-day half-spiral system. The double-cuts in this system have the advantage of a quicker collection during showery weather and lower tapping costs.

The "double three" system No. 8, shows an increase of 20.6 per cent over the control in 1943-44 and for the seven year period the figure is 20.4 per cent. The results show that the trees under the conditions of the experiment can stand up to the increased tapping intensity for a number of years at the cost of a small increase in the number of cases of Brown Bast. It must be noted that compared with the "double four" the increase in yield drops to 13.6 per cent, which, however, is still statistically significant. Assuming that the increased yield is real, a change over from "double four" to "double three" can be expected to give increased yields of a lower order than those obtained from a change over from the alternate-day half-spiral system to "double three."

The yields of systems Nos. 11 and 12 of 89 per cent intensity indicate again the benefit of the shorter cycle of periodic rest but the difference of 8.8 per cent over the period of 7 years fails to come up to the required significant standard.

Dry Rubber Content—The percentage dry rubber content figures are given in Table No. 3. The figures for 1943-44 are the lowest in the series for all systems of tapping since the commencement of the experiment, and after 4 years show some significant differences between treatments. The figures for the various tapping systems can still be considered satisfactory. As is to be expected the more intensive systems give the lower dry rubber contents and in Table I show the lower scrap yields.

Bark Renewal—Since the bark renewal figures have been satisfactory for the various systems for the first six years of tapping it was considered sufficient to check the renewal of the "double three" and the control in 1943-44. The average thickness of the renewed bark of the two tapping systems was 5.8 and 5.4 millimetres, respectively after approximately 14 months.

TABLE I

Mean Yield in Kilograms of Dry Rubber per Plot of 30 Trees *

	Tapping Systems	Preliminary yields 1936 37 †	Experimental yields 1943-44	Adjusted yields 1943-44	Scrap as % of total 1943-44
Sub-Block A Two-Day Series	1. S/2, d/2, (2×6m/12), 100% ...	66·6	83·7	80·6	7·5
	2. S/2, d/2, (2×6m/12), 12m/18, 67%	60·9	62·0	65·6	8·7
	3. S/2, d/2, (2×2d/4), 100%	64·1	85 2	85·0	6·9
	4. S/4//S/4, d/2, (2×6m/12), 100%	63·9	89·6	89·7	6·0
	5. 2S/2, d/4, 100 %	67·8	89·6	85·1	6·2
	6. 2S/2, d/4, 12m/18, 67%	62·3	60·4	62·3	7·4
Sub-Block B Three-Day Series	7. S/2, d/3, (2×6m/12), 67%	63·3	63·7	64·4	8·0
	8. 2S/2, d/3, 133%	65 5	99·1	97.2	6·5
	9. 2S/2, d/3, 6m/12, 67%	59·0	55·5	61·3	8·2
	10. 2S/2, d/3, 12m/18, 89%	66·4	72·3	69·5	7·4
	11. 2S/2, d/3, 8m/12, 89%	63·6	76·8	77·2	6·8
	Mean	63·9	76·2	76·2	7·2
	Standard Error			5·2	
	Sign. diff. (odds 19 : 1)				
	do *within* sub-blocks			14·7	
	do *between* sub-blocks			14·5	

* Approximate conversion to lbs. per acre × 7 † Ten months' tapping only.

TABLE II

Adjusted Yields as Percentage of System No. 1

	Tapping Systems	1937/38	1938/39	1939/40	1940/41	1941/42	1942/43	1943/44	1937/44
Sub-Block A Two-Day Series	1. S/2, d/2, (2×6m/12), 100%	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0
	2. S/2, d/2, (2×6m/12), 1·m/18, 67%	70·8	74·0	86·6	85·7	86·3	79·9	81·4	80.1
	3. S/2, d/2. (2×2d/4), 100%	110·4	108·6	109·3	111·6	105·9	114·4	105·5	109·3
	4. S/4//S/4, d/2, (2×6m/12), 100%	85·0	94·5	102·8	113·2	114·9	119·1	111·3	105·1
	5. 2S/2, d/4, 100%	96·8	105·7	107·4	115·2	106·9	112·1	105·6	106 8
	6. 2S/2, d/4 12m/18, 67%	73·2	74·2	86·5	86·0	78·4	78·3	77·3	78·8
Sub-Block B Three-Day Series	7. S/2, d/3, (2×6m/12), 67%	67·8	71·2	79·5	85·7	80·2	77·1	79·9	76·9
	8. 2S/2, d/3, 133%	112·3	111·6	123·4	122·9	128·5	126·5	120·6	120·4
	9. 2S/2, d/3, 6m/12, 67%	69·0	73·6	82·1	85·1	83·6	79·0	76·1	77·8
	10. 2S/2, d/3, 12m/18, 89%	75·8	77·6	94·7	85·8	86·6	90·7	86·2	85·0
	11. 2S/2, d/3, 8m/12, 89%	81·0	89·0	101·0	99·5	97·9	96·3	95·8	93·8
	Mean	85·6	89·1	97·6	99·1	97 2	97·6	94·5	94·0
	Standard error	3·4	3·8	5·1	5·4	5·0	5·5	6·4	4·1
	Sign. diff (odds 19 : 1)								
	do *within* sub-blocks	9·5	10·6	14·4	15·1	14·2	15·6	18·2	11·5
	do *between* sub-blocks	10·5	10·5	17·4	17·6	16·1	20·3	18·0	13·0

TABLE III

Dry Rubber Content Per Cent

	Tapping Systems	1937/38	1938/39	1939/40	1940/41	1941/42	1942/43	1943/44
Sub-Block A Two-Day Series	1. S/2, d/2, (2×6m/12), 100%	40·8	41·5	41·2	41·0	40·4	39·6	38·1
	2. S/2, d/2, (2×6m/12), 12m/18, 67%	40·5	41·4	40·8	40·5	40·0	39·3	38·7
	3. S/2, d/2, (2×2d/4), 100%	39·5	40·3	40·3	40·7	40·2	38·9	37·9
	4. S/4//S/4, d/2, (2×6m/12), 100%	40·8	42·2	41·6	40·9	39·8	38·5	37·2
	5. 2S/2, d/4, 100%	40·8	41·6	41·9	41·4	40·6	39·7	38·3
	6. 2S/2, d/4, 12m/18, 67%	40·9	41·3	41·3	41·3	40·6	39·7	39·0
Sub-Block B Three-Day Series	7. S/2, d/3, (2×6m/12), 67%	42·3	43·0	42·2	42·0	41·2	41·2	40·1
	8. 2S/2, d/3, 133%	40·6	41·0	41·1	41·3	40·2	38·8	37·0
	9. 2S/2, d/3, 6m/12, 67%	38·9	40·3	40·5	40·3	39·7	39·3	38·0
	10. 2S/2, d/3, 12m/18, 89%	40·1	40·8	40·5	40·7	39·6	39·1	37·4
	11. 2S/2, d/3, 8m/12, 89%	39·0	40·0	40·4	40·0	39·4	39·0	37·5
	Mean	40·5	41·2	41·1	40·9	40·2	39·4	38·1
	Error	0·51	0·46					0·47
	Sign. diff. (odds 19 : 1)			Not	Not	Not	Not	
	do *within* sub-blocks	1·4	1·3	significant	significant	significant	significant	1·3
	do *between* sub-blocks	1·4	1·4	,,	,,	,,	,,	1·3

TABLE IV

Number of Trees with Brown Bast

Tapping Systems	1938/39	1939/40	1940/41	1941/42	1942/43	1943/44
1. S/2, d/2, (2×6m/12), 100%	6	6	4	6	5	3
2. S/2, d/2, (2×6m/12),12m/18, 67%	0	2	3	3	5	3
3. S/2, d/2, (2×2d/4), 100%	3	5	8	8	8	6
4. S/4//S/4, d/2, (2×6m/12), 100%	2	4	7	7	10	5
5. 2S/2, d/4, 100%	3	5	11	12	7	6
6. 2S/2, d/4, 12m/18, 67%	0	4	1	3	5	2
7. S/2, d/3. (2×6m/12), 67%	3	3	4	3	7	3
8. 2S/2, d/3, 133%	8	11	12	14	6	6
9. 2S/2, d/3, 6m/12, 67%	4	6	3	3	1	3
10. 2S/2, d/3, 12m/18, 89%	4	5	5	5	3	2
11. 2S/2, d/3, 8m/12, 89%	3	5	7	7	3	2
	36	56	65	71	60	41

TABLE V

Census of Diseased and Damaged Trees (1943-44.)

Tapping Systems	No. of Trees in tapping		No. of Trees out of Tapping									
	Brown Bast	As a % of Total	Brown Bast	As a % of Total	Dry Bark	As a % of Total	Thin Bark	As a % of Total	Wind damage	As a % of Total	Total No. of Trees out of Tapping	As % of Total in Tapping
1 S/2, d/2, (2×6m/12), 100%	1	0·6	2	1·1	4	2·2	4	2·2	—	—	10	5·6
2. S/2, d/2,(2×6m/12), 12m/18, 67%	1	0·6	2	1·1	5	2·8	—	—	—	—	7	3·9
3. S/2, d/2, (2×2d/4), 100%	3	1·7	3	1·7	5½	3·1	1½	0·8	2	1·1	12	6·7
4. S/4//S/4, d/2,(2×6m/12) 100%	2	1·1	3	1·7	9	5·0	4	2·2	2	1·1	18	10·0
5. 2S/2, d/4, 100%	1	0·6	5	2·8	5	2·8	4½	2.5	7	3·9	21½	11·9
6. 2S/2, d/4, 12m/18, 67%	1	0·6	1	0·6	1	0·6	2½	1·4	3	1·7	7½	4·2
7. S/2, d/3, (2×6m/12) 67%	1	0·6	2	1·1	3	1·7	2	1·1	1	0 6	8	4·4
8. 2S/2, d/3, 133%	1	0·6	5	2·8	1	0·6	14	7·8	1	0·6	21	11·7
9. 2S/2, d/3, 6m/12, 67%	2	1·1	1	0·6	2½	1·4	2	1·1	2	1·1	7½	4·2
10. 2S/2, d/3, 12m/18, 89%	2	1·1	0	—	1	0·6	2	1·1	1	0·6	4	2·2
11. 2S/2, d/3, 8m/12, 89%	1	0·6	1	0·6	1	0·6	5	2·8	1*	0·6	8	4·4

* Erroneously reported as 4 in 1942-43.

Brown Bast—The total number of Brown Bast cases for each tapping year is given in Table IV. There has been a considerable reduction in the number of Brown Bast cases in 1943-44, mostly among mildly affected trees which are now considered free of the disease. A more detailed summary of Brown Bast cases in tapping and out of tapping is given in Table V, together with the number of trees out of tapping from other causes.

In this table the first column includes trees on the double-cut systems which may be completely dry on one side but are tapped on the other side. Trees on a single cut which are out of tapping for a part of the year either before or after the change of tapping panels are recorded as out of tapping from Brown Bast. None of the figures for Brown Bast is unduly high or calls for special comments.

THE PERFORMANCE OF IMPORTED CLONES IN CEYLON—VI

C. C. T. SHARP, *Botanist*

THE last account in this series of the yields of imported clones in Ceylon was given in the *Third Quarterly Circular* for 1941. Owing to a shortage of staff it was found impracticable to publish the yields for the next two years. For similar reasons the number of records received has also declined and of the original records published only those from four sources are still available. These are summarised in Table I.

Estate W.—For the last three months the trees were tapped S/2, d/2, 100%.

On the whole the results for the fourth tapping year are disappointing and may be attributed to the generally unfavourable condition for tapping in 1943. Tjirandji 1 has, however, shown a fair increase in yield and now takes first place.

The clones are growing on poor, badly washed soil and the yields are satisfactory in the circumstances.

The BD. 10 plot contains 15-20% buddings of BD. 2.

Estate A.D.—The drop in yield in the second tapping year was mostly due to changing the minimum girth at which trees were brought into tapping from 22 inches to 20 inches and the consequent large increase in the number of trees tapped. The trees were tapped from the beginning until the winter rest in 1943 on S/2, d/2, 100% system and thereafter on the double three system. The latter system seems to be particularly well suited to clones AVROS. 256 and Djasinga 1 which have both shown very large increases in yield. The smaller number of tappings of clones TJ. 8 and TJ. 16 is attributed to the longer time taken by these clones to dry after rain.

Estate C.—BD. 10 again shown an excellent increase in yield over the previous year. This is the more remarkable since all the other clones except AVROS. 49 have shown a small decrease in yield. It is unfortunate that the bad secondary characters of this clone make its use undesirable.

Iriyagama Division, Area 6, Experiment Station, Peradeniya.—Poor increases in yield are shown for all clones during the last two years in spite of increasing the intensity of tapping from S/2, d/3, 67% to S/2, d/2, 100%. The area is 1,600 feet above sea level and high yields would not be expected. However, all clones show a satisfactory level of yield compared with the seedling controls.

Yields from Commercially Tapped Areas

In January, 1944 a second questionnaire was sent through the Agents to all estates with budded Rubber in tapping. The estates were requested to submit yields from all their monoclone budded areas of 5 acres or over which had been in tapping for not less than a year. It was also requested that yields from smaller areas which were planted with the less widely used clones should be submitted

Considering the difficulties under which estates are now working a good response was made and yields from 1,100 acres of budded Rubber were available for analysis.

The principal results are set out in Table II which is in continuation of Table IV on page 19 of the *Quarterly Circular for 1943*. In this Table the yields of five of the most extensively planted clones are compared with Tjirandji 1. Although the comparisons are made in each case between clones growing on the same estate, it must not be assumed that they are growing under very similar conditions, but only that the bigger climatic differences have been partially eliminated.

Some corrections have been made in the figures previously published These are mostly due to changes in the areas from which the yields have been recorded.

Estate 1.—Clones BD. 5, BD. 10 and AVROS. 49 were heavily attacked by Oidium, but clone TJ. 16 escaped the worst of the attack and carried a good head of foliage. This is probably largely responsible for changes in the comparative yields of these clones.

Estate 2,—The tapping system has been changed from double-four (28/2, d/4, 100%) to double-three (2 S2, d/3, 133%). The yields throughout are poor and this can be attributed to the heavy incidence of Oidium on land at an altitude of 900-1,000 feet. Even so the increase in yield of TJ. 1 is satisfactory.

Estate 4.—The yields of all clones except BD. 10 are the averages of two or more fields.

Estate 8.—Small corrections in the acreage of each clone have brought the results more into line with those from other estates.

There are no new conclusions to be drawn from these data which show that TJ. 1 is in most cases the highest yielder of the proved clones which have been widely used in Ceylon and that yields of 1,000 lbs. per acre can be obtained under favourable conditions from budded Rubber before the trees are fully matured.

The yields in Table II are confined to those clones which have been in tapping for at least a year. Included in the replies to the questionnaire were a few records for shorter periods of some clones which have been less extensively planted in the past but are of interest in connection with replanting programmes which may be undertaken in the near future Of particular interest are the early yields from two estates of clones Glenshiel 1 and Prang Besar 86. The yields of these clones can be compared with those of several of the best known clones growing under similar conditions. (Table III).

The conditions for growth on estate 9 are good and the two most vigorous growers of the 1937 buddings as shown by the number of tappable trees per acre are TJ. 1 and TJ. 16. On the other hand GL. 1 which is a less vigorous grower shows by far the highest yield per tree. It is known from experience with this clone that it will not tolerate tapping at 100 per cent intensity for more than about a year, but even then its yield per tree is so much in excess of that of TJ. 1 that there is reason to believe that on a lower tapping intensity the good yields obtained in Malaya will be repeated in Ceylon.

The clone of principal interest in the 1938 buddings of Estate 9 is PB. 86. It is not usually a very vigorous grower and should be avoided on the poorer soil types, but at the early age of five years it yielded

TABLE I

Yields from Areas Where Several Clones are in Tapping Under Similar Conditions

Estate and District	Clone	Date of Planting Budded Stumps or budding in field	No. of trees tapped 1943	Tapping System	No. of tappings 1943	Yield lb. per tree per annum and age in years						
						8	9	10	11	12	13	14
W. Kelani Valley	BD. 10	1930/31	252	2S/2, d/4, 100%	91			5.8	7.4	10.0	7.7	
	BD. 5		385		89			4.6	6.5	8.2	7.6	
	AV. 49		197		89			2.9	4.5	5.2	5.8	
	AV. 50		121		88			4.3	7.1	7.6	7.5	
	TJ. 1		282		88			4.6	6.3	7.8	8.7	
	BD. 2		294		84			4.1	4.3	6.6	5.5	
	TJ. 16		497		90			4.0	5.3	7.7	6.9	
	AV. 256		291		87			3.3	4.5	6.2	6.3	
	DJ. 1		625		91			4.7	5.1	6.2	5.7	
A. D. Galle	BD. 10	1932	99	2S/2, d/3, 133%	98	6.2	6.1	6.7	8.4			
	BD. 5		104		101	6.5	5.3	5.4	8.6			
	PB. 25		76		95	6.3	5.2	4.2	7.6			
	PB. 23		102		95	4.7	3.7	4.3	6.5			
	AV. 49		114		103	5.7	3.8	4.1	7.8			
	AV. 50		126		105	5.2	4.8	5.0	8.5			
	AV. 256		114		105	3.4	3.2	3.8	7.6			
	TJ. 8		100		77	6.3	5.5	5.6	5.4			
	TJ. 16		99		89	6.9	4.5	4.8	6.9			
	DJ. 1		102		104	6.7	5.7	4.6	10.8			
P. Kurunegala	AV. 49	1930	47	S/2, d/2, 100%	157	5.1	7.0	7.0	7.8	11.1	11.9	
	AV. 50		48		157	5.4	7.0	8.7	8.6	11.1	11.0	
	AV. 152		35		157	5.2	7.0	9.1	9.7	12.2	11.7	
	CT. 88		46		157	—	8.2	7.8	8.3	12.8	12.4	
	TJ. 8		23		155	6.3	8.5	7.9	7.0	10.7	9.9	
	TJ. 16		24		155	11.2	10.1	8.7	10.0	14.7	13.6	
	BD. 2		31		155	6.2	7.3	6.8	9.4	12.8	12.6	
	BD. 5		47		155	6.6	7.8	8.0	8.2	11.8	11.5	
	BD. 10		42		155	6.7	8.5	10.1	12.4	17.8	18.9	
Iriyagama Div. Peradeniya	AV. 49	1929	59	S/2, d/2, 100%	143		2.7	3.0	3.9	6.0	5.6	5.8
	AV. 50	B/S	56				2.4	3.1	4.4	5.6	5.8	6.5
	TJ. 1	,,	58				5.1	5.9	8.1	9.0	7.8	8.0
	TJ. 8	,,	53				3.9	4.8	6.9	9.1	8.3	10.0
	TJ. 16	,,	55				5.5	5,5	6.7	7.4	6.6	7.0
	BD. 5	,,	56				2.6	2.6	3.6	4.6	4.9	5.5
	SR. 9	,,	56				—	3.1	4.0	4.7	4.4	5.6
	H. 2	,,	55				2.3	3.1	4.9	6.1	6.6	8,6
	Seedlings		59				1.9	2.2	3.1	4.0	3.1	3,9

TABLE II

Yields of Clones in Commercial Tapping and Age in Years

Estate	District	Acres	Clone	Trees tapped per acre	Tapping intensity 1943	6		7		8		9		10		11		12		13	
						Yield	%	Yield	%	Yield	%	Yield	%	Yield	%	Yield	%	Yield	%	Yield	%
1	Kalutara	33	TJ. 1	114	100									624	100	713	100	818	100		
		4½	TJ. 16	111	100									597	96	742	104	1159	142		
		22	BD. 5	111	100											708	09	700	86		
		3½	BD. 10	137	100									968	155	955	134	708	98		
		14	AV. 49	148	100									715	114	892	125	730	89		
		19	AV. 50	146	133									675	108	713	100	932	114		
2	Ratnapura	81	TJ. 1	93	133							313	100	359	100	511	100	729	100		
		66	TJ. 16	102	133									218	61	306	60				
		39	BD. 5	82	133							175	49	391	149	531	104	508	70		
		35	AV. 49	87	133									258	72	211	41				
		61	AV. 50	79	133							502	140	460	138	585	115	513	70		
4	Kalutara	19-234	TJ. 1	109	100	453		556	100	783	100	768	100	963	100	1,050	100	1167	100		
		24	TJ. 16	101	100			400	72	469	60	708	92	591	61						
		79	BD. 5	112	100					482	62	691	90	865	90	1.073	102				
		1	BD. 10	70	133													809	69		
		22	AV. 50	131	100					316	56	608	79	617	64						
5	Galle	1	TJ. 1	188	100					555	100	610	100	989	100						
		1½	BD. 5	127	100					355	63	450	74	617	62						
		1	AV. 50	155	100					420	76	539	88	798	81						
7	Ratnapura	8½	TJ. 1													394	100	616	100	748	100
		22	TJ. 16											630		519	132	593	96	657	88
8	K. V.	2½	TJ. 1	111	100									427	100	795	100	987	100	1,176	100
		4½	TJ. 16	111	100											623	78	994	101	960	82
		3½	BD. 5	111	100									454	106	789	99	1,065	108	1,068	91
		2½	BD. 10	111	100									522	122	921	116	1,328	135	1,110	95
		1¾	AV. 49	111	100									335	78	556	70		73	778	66
		1	AV. 50	111	100											926	116	1,139	115	1,105	94

TABLE III

Yields of Clones Glenshiel 1 & Prang Besar 86 Compared with other Clones for Short Periods of Tapping

Estate	District	Clone	Acres	Tapped per acre	Tapping System	Date planted or budded	Age first tapped	Period of tapping months	Age in years & yieid in lbs.			
									5		6	
									Lb. per acre	Per tree	Lb. per acre	Per tree
9	Kalutara	CT. 88	10	81	S/2,d/2,100%	1937	6	8½			293	3.6
		BD. 10	10	68	,,	,,	,,	,,			281	4.1
		TJ. 1	10	85	,,	,,	,,	,,			346	4.1
		TJ. 16	10	86	,,	,,	,,	,,			319	3.7
		G. 1	10	57	,,	,,	,,	,,			330	5.8
		PB. 86	10	26	,,	1938	5	,,	115	4.4		
		PB. 186	10	46	,,	,,	,,	,,	131	2.8		
		TJ. 16	10	69	,,	,,	,,	,,	218	3.2		
		BD. 5	10	19	,,	,,	,,	,,	58	3·1		
		PB. 25	10	63	,,	,,	,,	,,	148	2.4		
		AV. 163	7	27	,,	,,	,,	,,	56	2.1		
10	Kegalla	PB. 86	1	115	,,	1937	6	8	496	4.3		
		G. 1	2	40½	,,	,,	,,	,,	224	5.5		
		TJ. 1	15	88	,,	,,	,,	,,	264	3.0		
		AV. 49	9	104	,,	,,	,,	,,	328	3.2		

at the rate of 4.4 lb. per tree during 8½ months' tapping compared with 3.2 lb. for TJ. 16. The stand of tappable trees per acre is low but this cannot be regarded as a serious defect at the age of 5 years.

On Estate 10 only small areas had been budded with PB. 86 and GL. 1, but the good yields of these clones compared with TJ. 1 support the results obtained on Estate 9.

Too much importance should not be attached to the yields obtained from clones GL. 1 and PB. 86 during short periods of tapping, but that they confirm the yields obtained over longer periods of tapping in the country of their origin justifies their reproduction here.

PLANTING MATERIAL AND RELATED PROBLEMS*

C. E. FORD, *Geneticist*

Introduction.—I do not need to remind you that substantial acreages of old Rubber are at present being slaughter tapped and will fall due for replacement in 1945 and later years. Replanting problems may therefore be expected to regain the importance they have lost in the last 4 or 5 years. After the extent of a programme has been determined the first question that arises is the choice of planting material. In this talk I propose to discuss some aspects of this and related problems.

Though inevitably reduced and interrupted by present conditions, information on the subject of planting material is steadily being accumulated by the R. R. S., with the result that advice on the choice of material can be given with increasing precision and confidence. This information is derived partly from our own material at Dartonfied and Nivitigalakele, partly (in former years) from reports published abroad, from written enquiries made by planters and from estate visits generally, but probably most of all from the analysis of questionnaire returns submitted by estates. I know that with the multiplicity of forms that have to be filled in at present you will not be pleased when these questionnaires arrive. However, I don't think we have been very exacting so far and I do wish to emphasize their great value in helping to judge a clone's performance. The response to the last one issued, on commercial tapping yields, was very good and I should like to take this opportunity to say "thank you."

The most striking development during the last 3 or 4 years has been the tapping, for the first time in Ceylon, of substantial areas of budded Rubber. Yields, as indicated by the questionnaire returns, have in general been so satisfactory that there can be little lingering doubt as to the value of budgrafting as a means of increasing per acre yields and hence of lowering production costs and improving the competitive position of the industry. Reports of annual yields of 1,000 lbs. per acre are now almost a commonplace.

Present recommendations.—Though capable of yields considerably in excess of old seedling Rubber, many of the clones first planted in this country are no longer considered suitable either on account of bad secondary characters or because other material is capable of higher yields Our present general recommendations will shortly be circulated as a revision of Advisory Circular No. 20, first issued last year. This gives lists of material approved for large and small scale planting, respectively

*Address given to the Kalutara Planters' Association on June, 24, 1944; and to the Southern Province Planters' Association on September 17th, 1944.

together with notes on most of the clones included. Clones on the "large scale" list are TJ. 1, TJ. 16, GL. 1, PB. 86, MK. 3/2 and WG. 6,278, For all these clones there is an expressed, or implied, restriction as to soil or district or situation.

Tjirandji 1.—TJ. 1 remains probably the best all round clone for low-country use. Adverse comment on the clone is principally directed against its heavy head and the consequent late drying of tapping panels and loss of tapping days. This is likely to be a temporary drawback only and one that will be found in all vigorous clones with heavy heads that escape Oidium attack. The trouble can be expected to lessen as the trees grow older and taller and the leaf canopy lifts. In the meantime some improvement can be obtained by pruning low hanging branches, and also by light grooming of the trunks to remove moss and other epiphytic growths, which act as a reservoir of water.

Another drawback of the clone is its tendency to pre-coagulation. Several enquiries have been received recently on this subject in respect of TJ. 1 and other clones. Pre-coagulation appears to be associated with one or more of the following factors in addition to clonal differences :—

(1). Young trees.
(2). The re-opening of cuts after the annual rest period.
(3). Changing from one cut to another.
(4). Long intervals between tapping due to wet weather.

In general, severe symptoms appear to be of short duration but milder symptoms may persist for some time. Little or nothing is known of the underlying causes of the trouble but it can be reduced to a certain extent by irrigation of the cut with a solution of ammonia or sodium sulphite. There is nothing new in the use of chemicals to retard coagulation but the practice of applying a solution to the tapping cut is a novel one developed on Palmgarden Estate.

Glenshiel 1.—Proceeding to the next clone, Glenshiel 1 maintains its promise, though the yield data available are not so extensive as in the case of TJ. 1. The clone has a light narrow crown and does not therefore suffer from late drying to the same extent. It's light crown also makes it suitable for use in low-lying areas of "loose" soil where heavy headed clones like TJ. 1 do not get sufficient anchorage. I shall make a reference to tapping this clone later.

Glenshiel 1 enjoys a certain reputation for resistance to Oidium. This year trees of the clone have been seen severely attacked by the disease and it is important to realise that the apparent immunity of the clone is derived not from an innate resistance to the fungus, but rather from avoidance of the disease through early wintering. At present it appears that most of the observed differences between clones (in respect of Oidium attack) are to be attributed to differences in time of wintering, and that true variations in susceptibility, if they exist at all, are small.

TJ. 16.—TJ. 16 is a late winterer and invariably suffers severely from Oidum attack. For this and other reasons, such as its generally slow growth, it is now only recommended for use on estates that have had previous satisfactory experience with it.

PB. 86.—This clone has been reinstated in our large scale list, following the receipt of very satisfactory first year commericial tapping yield records from several estates.

MK. 3/2.—MK. 3/2 has been rather under a cloud since the report of extensive damage to the tapping panels of the trees at Nivitigalakele by a disease that was diagnosed as Canker of the newly tapped bark. In connection with this outbreak it is important to realize three points :—

1. Though the causal organism has been identified as a Phytophthora, this disease has quite different symptoms from the common Phytophthora disease of tapping panels known as Bark Rot, Black Thread or Black Stripe.

2. The disease has spread throughout the station and some 40 out of the 172 clones tapped there in 1943 have been more or less seriously affected. Hence MK. 3/2 is by no means unique in its susceptibility.

3. When disinfectants were regularly applied to the MK. 3/2 trees under experimental supervision the disease was rapidly brought under control.

Once the disease has got a thorough hold it is necessary to scrape away the affected tissue down to the wood. Since the main outbreak, only one tree has required treatment in this manner, and in this case it was established that the disease had spread under the bark from a previously affected patch. At the present time there is no sign of new attack and the old scraped patches are callousing vigorously.

While MK. 3/2 is undoubtedly very susceptible to this disease there is now no doubt that with adequate preventive treatment it can be controlled. This being so the R. R. S. continues to recommend the clone for large scale use in the wet low-country. Its suitability for drier areas has not yet been established. The average yield of 59 trees at Nivitigalakele last year was 13.5 lbs.

WG. 6278.—WG.. 6278 seems to be rather susceptible to exposure but it is capable of very good growth in sheltered areas. The yield at Nivitigalakele remains very good — 18.7 lbs. per tree from 15 trees last year — and no obvious defect has developed.

Clones for small-scale use.—Two further groups of clones including PIL. B84, PR. 107 and AVROS. 255, are recommended for use on a smaller scale. Some of these, if not already in tapping, will shortly be tapped in Ceylon and it may confidently be expected that one or more of then will later prove satisfactory for large-scale planting, while still however, and I hope, better, clones will become available for small-scale test

Small-scale tests on estates.—At this point I should like to emphasize the importance of small-scale tests on estates. We expect to go a long way yet in the improvement of yield and in the elimination of clone defects. Tests will certainly be made by the R. R. S., but that is not enough. Clones react differently to varying conditions of soil and climate and at present there is no sound basis for predicting what these differences will be. Examples of such differences in local suitability must be known to you all, and the point is further illustrated by the restrictions as to soil and other conditions with which we have had to qualify our recommendations. Hence without small-scale estate trials progress in selection will be retarded, and, conversely estates that do test the new clones will have the benefit of early knowledge of their suitability to their own local conditions. It is suggested that the most convenient scale on which to test new clones would be to allot to each an area sufficient to constitute a single tapping task at maturity.

At the same time it is advisable to utter a word of warning against going to the opposite extreme and planting up a newly introduced clone on a large scale, however great its reputation may be elsewhere. This will apply equally to newly imported clones with a high reputation abroad and to promising new local material. The reason for this is again the impossibility, at present, of predicting what the reaction of a clone to a new environment will be.

Spread the risk.—The value of a clone as planting material must always be attended with a certain degree of uncertainty, even after its ability to produce satisfactory early yields has been demonstrated conclusively. There are, for instance, the uncertainties of yield at maturity. performance on first, second, etc., renewed bark; economic life, and so on. There is also the uncertainty of its reaction to new diseases, or to variant strains of old diseases. All trees of a clone possess the same

innate hereditary constitution, and all, therefore, carry the same degree of susceptibility or resistance to a given pathogen. Under such conditions the spread of a new disease, or of a new virulent strain of an old one, may be explosively violent. (As, for instance in the MK. 3/2 case I have just described). The moral is — spread the risk by planting several clones. I know that in the past most estates have done this, but I find that now a new line of thought is beginning to appear, which may be expressed something like this, — "We have demonstrated that clone X is suited to our conditions, so why bother about other material?" I hope you will agree that the factors I have mentioned provide ample reason.

At present, unfortunately, there is a shortage of clones suitable for large-scale use. As I mentioned earlier, there are only 6 clones on the R. R. S. list and in every case the recommendation is qualified in some respect. Hence for the present, the R. R. S., though in general recommending that no clone should be used on a scale larger than 25 per cent of the total area to be planted, approves the use of a single clone up to a maximum of 50 per cent on estates where its local suitability has been established.

Clonal seedlings.—So far I have deliberately avoided reference to clonal seedlings. During the past few years we have had populations of Prang Besar Plot C and Tjikadoe Isolation Garden seedlings under observation at Nivitigalakele. Both populations have yielded reasonably well, and both gave just short of 10 lbs. per tree in 1943-4 in their 4th and 5th years of tapping, respectively. This compares with 15 lbs. and 17 lbs. per tree for WG. 6278, and 12 lbs. in both years for MK. 3/2. Secondary characters, however, are not so satisfactory. 10 per cent of the PB. seedling trees had been rested for Brown Bast before the end of the 4th tapping year and this percentage is still increasing. Bark renewal in the PB. trees in general, is even and satisfactory. The incidence of Brown Bast in the Tjikadoe seedlings is not so high, but there is a marked tendency to fluting, and renewed bark is uneven, sometimes very uneven.

At the time the seeds were purchased these 2 gardens contained 14 and 25 clones respectively. The number of possible individual families, including selfs but omitting reciprocals, is 105 in the one and 325 in the other. Owing on the one hand to clonal differences in flowering period and the amount of seed set, and on the other to varying time of seed harvest, one sample of seed may differ very considerably from another in genetic composition. Hence further populations of seedlings from these gardens may be better or worse than the two studied at Nivitigalakele in respect either of yield or secondary characters or both. Reasonable certainty as to the value of seedling material of this kind can only be got by testing all or at least a large portion, of the possible individual families that could occur. This is one of the prime functions of the hand pollination programmes undertaken by the R. R. S.

This goes to strengthen our view that seedling families, no less than clones, require a lengthy period of test before they can be recommended for planting on more than experimental scale; and further, that the distinction between seedling families and clones is really irrelevant — they should be considered solely on their individual merits as planting material. I may add that this substantially reflects the last published views of the three principal Research Institutes further East.

With supplies from Malaya and the N. E. I. cut off, the only sources of clonal seed remaining are local and South Indian. Eight areas have now been approved by the Rubber Controller and all have been placed on the R. R. S. list as suitable for experimental planting, though, except

for TJ. 1 seedlings, more with the intention of indicating the material available than from confidence in its ultimate value. It must be realized that none of these areas was planted as a seed garden, and that our knowledge of the illegitimate families of the included clones, again with the exception of illegitimate TJ. 1, is either negligible or entirely lacking.

This position will be rectified to some extent in 2 or 3 years' time when the seed gardens planted immediately prior to the war and in the early war years come into bearing. Most of these areas contain only clones known to be good parents, and the resulting seed could therefore be recommended for use on a small scale with a considerable degree of confidence.

A final point about clonal seedlings is that they show a great variation in yield from tree to tree, which, though less than in a population of unselected seedlings, is yet much greater than that between budgrafts of a good clone. Some trees give a very low yield, and provision should be made for the elimination of these trees at least, by a high initial planting density. The R. R. S. recommends that the initial stand should be in the neighbourhood of 250 trees per acre and that progressive thinning on the basis of test tapping results should be carried out from the time that the trees reach a girth of 12 inches at 20 inches from the collar. The subject is discussed in greater detail in the R. R S. Advisory Circular No. 19. The important points to realize are, first, that the yielding capacity of a clonal seedling area will vary directly with the degree of selective thinning carried out, and second, that the responses will be considerably greater than in a block of budgrafts all of the same clone. I propose to conclude with brief references to three associated topics, Tapping, Brown Bast, and Nurseries.

Tapping.—Experience of the last 2 3 years supports the earlier conclusion that, in general, budded Rubber trees can safely be tapped on 100 per cent systems, though in some circumstances and with some clones it may be necessary to adopt less intense systems. Proceeding to the particular, it seems safe in the early years to tap TJ. 1 on 100 per cent systems in the wet low-country, though a careful watch sholud be kept for B.B. Our experience with Glenshiel 1 is rather different; in a tapping experiment on Dartonfield there appears to be a definite association in the second and third years of tapping, between incidence of B.B and interval between tappings, the shorter tapping interval being associated with increased B.B. We suggest, therefore, that this clone be tapped on S/2, d/2, 100% in its first year, and thereafter on S/2, d/3, 67%. In general we recommend that a change should be made to a milder systems if the proportion of B.B. trees reaches 7½ per cent of the trees in tapping.

Brown Bast.—Special treatment of B.B. trees in old Rubber areas has long been abandoned as uneconomic. The position is very different,, however, in the case of valuable young budded trees with virtually the whole of their productive life before them, especially where the stand per acre does not allow for further thinning. The R. R. S. has therefore been reconsidering the problem of B. B. treatment and will shortly issue an Advisory Circular on the subject. The suggested system of treatment is based primarily on the regular inspection of all trees in order to detect cases of the disease at as early a stage as possible. The affected areas are either isolated, or the whole tree is rested, depending upon the severity of the symptoms, and if there is no recovery after a given period of rest it is suggested that the scraping treatment tested and described by Mitchell in the twenties should be tried. At present there is little knowledge of how even the commonly planted clones react to the suggested treatments and estates must largely be guided by their own experience. The present emphasis on maximum production necessarily imposes an added strain on the trees which will inevitably be reflected in a somewhat

increased incidence of B. B. The matter is therefore a pressing one and estates are urged to give it their careful attention.

Budwood nurseries.—If estates have not already done so, they are advised to review their requirements in the way of budwood and stock nurseries at once. In established multiplication nurseries it may be necessary to cut back over-mature wood and at a later stage it will be advisable to check up on the authenticity of the material to be used.

Stock nurseries.—Evidence is accumulating that the yield of the scion is influenced by the potential yield of the stock, and the results of 2 experiments carried out in Java indicate that this effect may on occasion, determine a difference in early yield of as much as 30 per cent. In Java, illegitimate seedlings of a number of clones were recommended for use as stocks. Several of these clones have been planted in this country but four only have reached seed bearing age, namely TJ. 1, AVROS,. 163, BD. 10 and TJ. 16. It is accordingly suggested that seedlings of these four clones should be the first choice for stock nurseries. Seed should be gathered from polyclone areas where possible; otherwise from the adjoining boundaries of monoclone blocks. Failing the four clones mentioned, well mixed clonal seedlings from any sources other than the centres of monoclone areas are probably to be preferred to unselected seedlings. Seed from the centre of a monoclone block, if any can be found at all, is likely to be self-fertilized, and in general, is known to produce weakly seedlings. The one exception at present is selfed TJ. 1 seed, which can be used safely. Whatever seed is used, there should still be selection in the nursery on the basis of vigour. Detailed recommendations on the preparation of stock nurseries are given in Advisory Circular No. 3.

CEYLON CLONES—X (1943-44)

C. E. FORD, *Geneticist.*

THIS article continues the series of reports commenced in 1933 and gives the yields from test tapping of the more important Ceylon clones for the tapping year 1943-4, or, in some cases, the calendar year 1943. It is convenient also to include in this report the yield records of a number of isolation garden seedlings in test tapping on the Research Scheme's Experiment Station, Nivitigalakele.

Acknowledgment is again made to the proprietors of the local clones mentioned for permission to publish the results.

Yields of the principal Ceylon clones in tapping at Nivitigalakele during the tapping year 1943-4 are given in Table I. Tapping is on the half-spiral alternate-daily system and yields have been calculated to an arbitrary standard of 130 tappings. The actual number of tappings was 148 to 153 and the yields were in fact about 15 per cent higher than those given in Table I. Clones PB. 23 and PB. 25 have been included for comparison.

Table II gives the mean yield per tree per annum of selected Ceylon clones on Millakanda and Stenness Estates as well as at Nivitigalakele for the period 1932-43. Yields are again adjusted for 130 tappings where tapping was on half-spiral alternate-daily (S/2, d/2 100%), for 87 tappings where tapping was on half-spiral third-daily (S/2, d/3, 67%).

Recording was by cup coagulation and the biscuits so formed contain a certain amount of moisture even after drying in the smokehouse or drying-room and allowance is made for this in the calculation of yields of dry rubber. As a result of certain wartime changes in procedure at Nivitigalakele it was discovered during the present year that the moisture

content of the biscuits was appreciably higher than had been allowed for. A further adjustment has now been made and the figures in the tables represent a reasonably accurate estimate of the true yields of dry rubber. This second adjustment accounts for the difference between the yields of the material at Nivitigalakele for the year 1942-43 published in the *Combined Quarterly Circulars 1943* and those given here.

Millakande 3/2—The discrepancy between the yields of this clone at Nivitigalakele and on Millakande Tea Estate were discussed by O'Brien and De Silva (1943), who pointed out that a large part of the difference could be attributed to the non-inclusion of cup lump in the Millakande yields. From January, 1944 cup lump has been included and the yields to date this year are in much better agreement with those at Nivitigalakele.

There is also an appreciable difference in yield between the yields of the original test tapped trees at Nivitigalakele and those of the block as a whole. This is largely due to the fact that test tapping was commenced less than four years after budding and the best grown trees were selected. The original trees are now (1944) being tapped on renewed bark and it is satisfactory to note that the yield, if anything, has increased.

Wagga 6278—There is now no doubt as to the high yield and good secondary characters of this clone at Nivitigalakele. The need is for yield records from other localities. The clone has been widely planted in this country though it will be some time yet before yield figures are available from areas in commercial tapping. In its early years it grows well in sheltered areas and on good soil, but is rather backward in exposed positions and on poorer soil. In this respect it can be grouped with Glenshiel 1 PB. 86 and TJ 16. It is characteristic of the clone to grow very tall and to form a narrow crown, often with a single main branch.

TABLE I

Selected Clones in 1928 Clearings, Nivitigalakele

Yields of Dry Rubber. Tapping year 1943-4. Tapping System (S2/,d/2, 100%)

Clone	No. of trees tapped	Age in years on 1-7-43	Year of tapping	Mean yield in lb. per tree per 130 tappings [4]	Mean girth in inches [3] January 1943
Millakande 3/2 [1] ...	10	13	10	15·0	42·8
do [2] ...	59	13	1-10	11·9	36.1
Wagga 6278 [2] ...	6	13	8	16·7	37.8
do [2] ...	15	13	6-8	15.9	35.1
Hillrcoft 28 [1] ...	7	12½	8	16.5	45·1
do [2] ...	19	12½	6-8	14.5	40.8
Millakande 1/3 ...	9	12	8	13.9	39.0
Beau Sejour 3 ...	8	13	8	13.1	38.4
Diyaberiyakande 1 ...	9	13	8	12.2	32.0
Dalkeith 5315 ...	7	13	8	11.9	38.0
Prang Besar 23 ...	7	12½	8	13.0	35.8
Prang Besar 25	8	13	8	8·8	35.0

Notes:—1. Original test-tapped trees only
2. All trees
3. Diseased and damaged trees excluded
4. Actual number of tappings 148-153
5. At 36 inches above the union

TABLE II

Selected Ceylon Clones. Adjusted Yields of Dry Rubber, 1932-1944.

Clone	Locality[1]	No. of trees tapped[2]	Age when tapping commenced	Mean[3] yield in pounds per tree per 130 tappings on S/2, d/2, 10%												Mean girth ins.[4] Jan. 1943
				1932	1933	1934	1935	1936	1937	1938	1939	40-41	41-42	42-43	43-44	
Millakande 3/2	N	12-10	4			3.0	6.0	8.7	12.2	11.7	17.0	17.7	15.3	15.7	15.0	42.8
do	M	10-10	6				3.9	6.5	7.9	9.0	10.4	11.0	9.8	9.8	11.3	—
Wagga 5278	N	7-6	6					2.4	8.2	13.7	14.7	17.1	13.5	19.1	16.7	37.8
Hillcroft 28	N	10-7	5½					4.5	7.5	12.0	12.3	13.7	12.0[6]	16.5	16.5	45.1
do[5]	S	12-8	6	12·0	13·4	17.4	19.8	12.4*	10.9*	20.4	19.2	20.0	—	19.3**	16.4*	48.2[7]
Hillcroft 55	N	24-20	6										3.0	5.7	5.9	24.0
do	M	10-10	5				2.6	5.1	5.1	6.9	6.2	6.3	—	—	—	—
do[5]	S	7-7	7		16·1	18.1	12.4*	15.1*	13.4*	19 9*	13.0*	14.1*	19.8*	18.3**	17.6*	45 6[8]
Millakande 1/3	N	10-6	5					0.7	3.0	5.6	9.2	9.7	14.3	9.9	13.9	39.0
Beau Sejour 3	N	10-8	6					3.9	4.5	8.4	8.2	6.0	12.0	9.6	13.1	38.4
Diyaberiyakande I	N	9-9	6					1.8	3.9	8.2	8,2	9.7	11.5	9.4	12.2	32.0
Dalkeith 5315	N	10-7	6					1.3	3.8	6.3	8.2	8.4	10.9	9.8	11.9	38.0
Mean actual No. of tappings, Nivitigalakele.						110	108	105	120	127	120	122	113	136	151	

Notes: 1.—N=Nivitigalakele, M=Millakande Estate. S=Stenness Estate.
2.—Maximum and minimum numbers during period of tapping.
3.—Diseased and damaged trees excluded
4.—At 36 inches above the union,
5.—Yields for period 1940-1943 refer/to the calendar year.
6.—Three trees only.
7.—In May, 1943.
8.—In July, 1943.
*—Tapped on S/2, d/3, 67%. Yield calculated for 87 tappings.
**—Tapped part year on S/2, d/2, 100% and part on S/2, d/3, 67%.

TABLE III

Isolation Garden Seedlings, Nivitigalakele
Yields of Dry Rubber, 1938-44
Tapping System S/2, d/2, 100%

Material	Planted as stumps in	Age of stumps at planting	Number of trees tapped in 1943-4	Mean yield per tree in pounds						Mean girth in inches [2] Jan. 1943	Brown Bast cases up to Feb. 1944
				1938	1939	40-41	41-42	42-43	43-44		
Tjikadoe [1]	October 1932	1½ years	157	2.5	3.1	4.0	4.2	6.2	6.4	28.6	9
Tjikadoe	June 1935	4 years	106		2.2	4.3	6.7	7.2	8.9	30.4	12
Prang Besar Plot C	June 1935	2½ years	132			3.1	4.6	7.1	9.1	28.6	13
Prang Besar Plot B	Jnue 1935	2 years	57			1.8	2.6	5.2	6.4	26.9	1
Mean number of tappings				103	126	125	112	135	149		

Notes :—1. All but 20 selected trees tapped on 2S/2, d/3 from March, 1942.
2. At 36 inches from the ground.

Hillcroft 28—The yield of this clone at Nivitigalakele does not yet appear to have reached its maximum. On Stenness Estate the yield decreased during 1943-44 following the change from S/2, d/2, 100% to S/2, d/3, 67% tapping in September, 1942. The few available records of the clone in commercial tapping indicate that in the first years of tapping it is capable of giving yields approaching those of TJ. 1.

The chief characteristics of HC. 28 are its outstandingly vigorous growth and the fluting at the base of the tree, though the latter character appears to vary with the locality. At one time it appeared, that the clone might prove particularly susceptible to Brown Bast but later evidence suggests that the liability to this disease may be no greater than in some of the commonly planted clones. The rather large number of cases of this disease previously reported in HC. 28 at Stenness Estate is no doubt to be associated with the favourable situation there and the consequent high yields.

Hillcroft 55—The high yields of the original buddings of this clone have not been reproduced either on Millakande Estate or at Nivitigalakele.

The remaining Ceylon clones included in Tables I and II are now giving good yields though all have been slow in attaining a satisfactory yield level. All have one or more unsatisfactory secondary characters and none is, therefore, recommended for planting.

Isolation Garden Seedlings

The yields of four separate groups of isolation garden seedlings in tapping at Nivitigalakele are given in Table III. In this table the yields of diseased trees have been included in the calculation of the averages, whereas in Tables I and II diseased trees were excluded. These two tables are therefore not strictly comparable.

Comments on this material are given in the article "Planting Material and Related Problems" (this Circular p. 20).

REFERENCE

O'Brien, T. E. H. & C. A. de Silva (1943) Yields of young budded and seedling Rubber. Rubber Research Scheme (Ceylon) *Quarterly Circular* 20. pp. : 15-22

EXPERIMENTS ON THE CONTROL OF BARK ROT

C. E. FORD, *Geneticist*

INTRODUCTION

A disease of the renewing bark was known to have been present on the Research Scheme's Experiment Station, Nivitigalakele since 1940, but it was not until the S. W. Monsoon of 1943 that its incidence became serious. The symptoms were then found to be different from those of normal Bark Rot (Black Stripe, or Black Thread) and the disease was diagnosed as Canker of the newly tapped bark. Ultimately 40 out of the 172 clones in tapping, together with a number of isolation garden and unselected seedlings, were more or less seriously affected.

Though they may be closely related, it is necessary to emphasize the distinction between the two diseases, and in this account they will be referred to as Black Stripe, and Tapping Canker, respectively, the name Bark Rot being used as an inclusive term for both. At this point it should be recorded that Black Stripe at Nivitigalakele was either absent or sufficiently rare to be overlooked during the years 1938-1943 inclusive.

The first symptoms of Tapping Canker observed on trees of MK. 3/2 were small, roughly circular, depressed patches on the renewing bark, from half-an-inch to an inch above the tapping cut. The surface was black and often peppered with a white mycelium; the tissue below was devoid of latex, water-logged and yellowish brown in colour. The surface of the wood was stained brown, with very narrow, lighter brown lines extending downwards, and occasionally upwards, below apparently healthy bark. In severely affected trees the depressed patches coalesced and large wounds resulted. In some trees the disease spread into healthy bark below the tapping cut and although at first this spread could not be detected at the surface it later became apparent, usually as a vertical crack in the bark with decayed, gritty, brown-stained tissue within, and often with pads of coagulated latex overlying the wood. The disease sometimes spread in a similar way into virgin bark above the tapping panel, and at least one instance was noted of apparent reverse spread from a primary infection on virgin bark downwards into renewing bark.

A secondary effect is the appearance of vertical cracks in renewing bark at the site of naturally-healed diseased patches, accompanied by bleeding and the development of pads of coagulated latex at the level of the cambium. This was observed on a small number of trees during 1944.

The two experiments described below were set up to compare different preventive and curative treatments with various disinfectants. At the same time more careful routine treatment was adopted, with the result that the disease was rapidly brought under control. Apart from one localised outbreak in March, which was traced to accidental failure to carry out normal preventive treatment, the Station seems to have been free from Tapping Canker in 1944, though there was a minor outbreak of Black Stripe in July and a rather more severe one in September.

Causal Organism

A *Phytophthora* species, not yet identified was isolated from diseased bark of one of the MK. 3/2 trees by the Plant Pathology Division of the Department of Agriculture, Peradeniya. Three series of inoculation tests were made with this fungus, one at Peradeniya, and two on trees of MK. 3 2 and other clones at Nivitigalakele. It is reported that in the Peradeniya series superficial symptoms were developed similar to those originally observed at Nivitigalakele. In contrast, the symptoms produced on the Nivitigalakele trets were ill-defined and were more nearly like those of Black Stripe. Only about 50 per cent successful 'takes' were obtained at Nivitigalakele, and in the second series the infected area healed rapidly in spite of favourable weather for spread and the suspension of routine application of disinfectant to the tapping cut. The difference in symptoms and the apparent loss of virulence are rather puzzling and further tests would be desirable.

In Ceylon, both Black Stripe and Canker have been attributed to the same species, *Phytophthora palmivora* Butler (Murray, 1930b). The marked difference, however, between the symptoms of Black Stripe and those of Tapping Canker as observed at Nivitigalakele, and the emphasis placed by Petch (1921, p. 127) on the distinctiveness of the two diseases, are difficult to reconcile with a common causal organism and strongly suggest that at least different physiological races are involved. Thompson (1929) and Murray (1930a) have found variant races within the species *P. palmivora*, while the former has discovered that in Malaya both diseases may be caused by several different species and forms of *Phytophthora*. It seems not unlikely that the same situation may exist in Ceylon and the outbreak of Tapping Canker at Nivitigalakele may well furnish an example.

Experiments

General.—Two experiments to compare the efficiency of different disinfectant treatments as preventives of Bark Rot were commenced in September, 1943 and were continued for a year. Each treatment consisted of one water-soluble disinfectant applied the day after each tapping, though from 8-2-44 onwards only during wet weather; and one waterproof disinfectant, originally applied every 10 days, but from 20-11-43 onwards after every 4 tappings (the tapping system being half-spiral alternate-daily (S/2, d/2, 100%). Waterproof disinfectants were at first applied to dry bark only, but later (commencing in February) application to damp, though not dripping wet bark was permitted. Separate preventive and curative concentrations of the water-soluble disinfectants were used up to 31-1-44, thereafter a single concentration only was used. Five proprietary disinfectants were used in the experiments; three water-soluble (numbered 1, 2 and 3); and two waterproof (numbered 4 and 5). Disinfectant No. 4 was used as received; it is stated to contain 10 per cent tar acids in a greasy base. Disinfectant No. 5 was diluted with coconut oil before use.

Inspection rounds were made each week up to 29-2-44, and thereafter once a month. Each newly affected tree was scored as one attack irrespective of the number of points of infection, and not more than one attack was recorded for any one tree in any one month. Scoring of new infections commenced afresh each month. Individual points of infection were scored from 1-3-44 onwards. Virtually the whole of the attacks recorded were pin-point infections that would hardly be noticed in estate practice and which healed leaving scarcely a trace. The few exceptions will be mentioned in the accounts of the individual experiments given below. The small size of the infections made distinction between Black Stripe and Tapping Canker attacks impracticable, though the fact that the majority were circular rather than linear suggests that they are largely to be attributed to the latter disease.

Experiment No. 1.—This experiment was set up on 52 trees of clone MK. 3/2 at Nivitigalakele, and was factorial for two types of water-soluble and 2 types of water-proof disinfectant. There were thus four treatments, each of 13 trees, as follows:—

Treatment 1	Disinfectants 1 & 4
Treatment 2	Disinfectants 1 & 5
Treatment 3	Disinfectants 2 & 4
Treatment 4	Disinfectants 2 & 5.

For various reasons the concentrations of the disinfectants used were changed four times during the course of the experiment. These changes are shown in Table I.

Experiment No. 1

TABLE I

Concentration of disinfectants used

Period	Preventive			Curative	
	Disinfectants				
	1	2	5	1	2
5. 9.43—19.11.43 ...	5.0%	5.0%	5.0%	8.0%	15.0%
20.11.43—31. 1.44 ...	7.5%	7.5%	10.0%	10.0%	15.0%
1. 2.44—30. 6.44 ...	10.0%	10.0%	10.0%	10.0%	10.0%
1. 7.44—31. 8.44 ...	7.5%	7.5%	10.0%	7.5%	7.5%

Note.—Disinfectant No. 4 was used as received throughout

On 1-3-44 the tapping cut was changed to the opposite panel on 44 out of the 52 trees in the experiment.

The results are set out in Table II. It will be noted that owing to the structure of the experiment each attack is scored once under the water-soluble and once under the water-proof disinfectant.

TABLE II

Number of attacks recorded during successive periods

Period	Water-soluble disinfectant		Waterproof disinfectant		Total
	1	2	4	5	
5. 9.43—30.11.43 ...	17	12	14	15	29
1.12.43—29. 2.43 ...	8	8	6	10	16
1.3.44—30. 6.44 ...	16	12	12	16	28
30.6.44—31. 8.44 ...	3	1	2	2	4
5. 9.43—31. 8.44 ...	44	33	34	43	77

With one exception no attack resulted in a wound greater than one centimetre in diameter. The exception, tree 49, was severely attacked and had to be scraped. The attack was traced to development under the surface of the renewing bark from a site infected prior to the commencement of the experiment.

These results show slight but consistent differences in favour of disinfectant 2 and disinfectant 4 though at no stage are the differences significant. The difference between the two water-soluble disinfectants, however becomes significant at the 99:1 level if judged on the number of individual points of infection. The summed counts for April and May, 1944, the two months of heaviest infection, are given in Table III.

TABLE III

Total individual points of infection scored in April and May, 1944

Water-soluble disinfectant		Water-proof disinfectant		Total
1	2	4	5	
39	19	27	31	58

Experiment No. 2

Experiment No. 2.—Two hundred and forty previously unaffected trees in the 1935 clearing at Nivitigalakele were chosen for this experiment, principally from mixed local clones. With the one restriction that in any clone there should be an equal number of trees receiving each treatment, 80 trees were allotted at random to each of the three treatments. The disinfectants compared were three water-solubles each combined with one water-proof, as follows:—

Treatment 1 Disinfectants 1 & 4
Treatment 2 Disinfectants 2 & 4
Treatment 3 Disinfectants 3 & 4

The concentrations used are shown in Table IV.

TABLE IV

Concentrations of disinfectants used

Period	Preventive			Curative		
	Disinfectants					
	1	2	3	1	2	3
6.9.43—31.1.44	5.0%	5.0%	3.0%	8.0%	15.0%	5.0%
1.2.44—31.8.44	7.5%	7.5%	5.0%	7.5%	7.5%	5.0%

The experiment was rather cumbersome and on 1.3.44 the number of trees in each treatment was reduced to 60. Tapping cuts were changed on 148 out of the 180 trees on the same day.

The results are given in Table V, and are again in favour of Disinfectant No. 2, the difference from No. 3 being just significant. The number of individual points of infection in April and May, 1944 are shown in Table VI, the differences this time being non-significant.

TABLE V

Number of attacks recorded

Period	Disinfectant			Total
	1	2	3	
6.9.43—29.2.44	50	33	48	131
1.3.44—31.8.44	31	36	46	113
6.9.43—31.8.44	81	69	94	244

TABLE VI

Total individual points of infection scored in April and May, 1944

Disinfectant			Total
1	2	3	
72	58	76	206

The average size of the lesions developed in this experiment was probably rather larger than in Experiment No. 1, though with seven

exceptions none exceeded about 2 mm. in diameter. The 7 exceptions occurred in clone AVROS. 50 and PM. 13 where 2 to 5 narrow vertical wounds occurred. Development of these wounds stopped either before (P.M. 13) or when (AVROS. 50) the tapping panels were changed. There was no evidence of a treatment effect as the seven cases were distributed 2:2:3 between the three treatments.

Conclusions.—The main conclusion to be drawn from these experiments is that under Nivitigalakele conditions all the treatment combinations tested are effective preventives of both Tapping Canker and Black Stripe. It may also be concluded that of the water soluble disinfectants. No. 2 is rather more efficient than Nos. 1 and 3. Lastly, the concentrations of water-soluble disinfectants used during the final phase of the experiments are sufficient to cure small infections.

It should be noted that Tapping Canker can only be cured by disinfectant treatment in the early stages. Patches exceeding ½-inch diameter must be treated by scraping, as described in Advisory Circular No. 21.

REFERENCES

Murray, R. K. S. (1930a), A Disease of Young Budshoots caused by *Phytophthora palmivora* Butler, *Trop. Agriculturist*, **74**: 216-218

Murray, R. K. S. (1903b). Diseases of Rubber in Ceylon, Rubber Research Scheme (Ceylon)

Petch, T. (1921). Diseases & Pests of the Rubber Tree—London: Macmillan

Thompson (1929). *Phytophthora* Species in Malaya. *Malayan Agricultural* Journal, **17**: 53-100

MEETINGS

RUBBER RESEARCH SCHEME (CEYLON)

Minutes of the sixty-ninth meeting of the Rubber Research Board held at the Secretariat, Colombo, at 2·30 p.m. on Monday, 6th March, 1944

Present.—Mr. L. J. de S. Seneviratne, C.C.S, (in the chair), Mr. T. Amarasuriya, M.S.C., Mr. W. H. Attfield, the Hon'ble Mr. G. E. de Silva, M.S.C., Mr. L. P, Gapp, Mr. F. H. Griffith, M.S.C., Mr, W, N, Gunawardena, J.P., Mr. R. J. Hartley, Mr. R. C. Kannangara, M.S-C., rM. R, C. L. Notley, Mr. F. A. Obeyesekere. Mr. S. F. H. Perera, Mr. J. L. D, Peiris and Mr. G. R. Whitby, M.S.C.

Mr. T. E. H. O'Brien, Director, was present by invitation.

Apologies for absence were received from Messrs. W. P. H. Dias, J.P., C. E. Jones, C.C.S. (Deputy Financial Secretary) and E. W. Whitelaw.

1. Minutes

(*a*) *Confirmation.*—Draft minutes of the meeting held on 9th December, 1943, which had been circulated to members, were confirmed and signed by the Chairman.

(*b*) *Matters arising from the minutes* —

Insurance of buildings.—Reported that the insured values of the Scheme's buildings and equipment had been increased to their approximate present values.

2. Board

(*a*) *Chairman.*—The Chairman reported that he had assumed duties on 14th February, 1944.

(*b*) *Mr. L. P. Gapp.*—The Chairman reported that Mr. L. P. Gapp had been renominated as a representative of the C. E. P. A. for three years from 1st April, 1944.

3. Experimental Committee

Recommendations made at meeting held on 8th February, 1944 :—

(*a*) *Dartonfield approach road.*—The recommendation was approved that arrangements be made for resuming control of the section of the road between the junior staff bungalows and the factory.

(*b*) *Baduragalla cart road.*—As recommended by the Committee, the payment made by the Director for the use of the Baduragalla cart road during 1943 was approved.

(*c*) *Output bonus.*—The recommendation was approved that a bonus at the same rates as paid in 1943 should be paid to the estate staff on the monthly increase in crop over 1942.

(*d*) *Appointment of Research Assistants.*—The suggestion that local graduates be appointed as Research Assistants with a view to being finally trained overseas if found suitable was approved in principle.

(*e*) *Water supply at Dartonfield.*—An estimate for providing a separate water supply to the factory by damming the stream above the factory was approved. Agreed that a new pump be installed at the well.

(*f*) *Power supply at Nivitigalakele.*—Agreed that the engine at Nivitigalakele be replaced by a new one. Estimates from several firms were considered and arrangements made for purchasing a new engine.

The minutes were adopted.

4. Reports

(a) Director's report for the 4th quarter, 1943 —

Smallholdings Department

Food Production.—Noted that the Rubber Instructors did part time work on food production in their ranges under the instructions of emergency A. G. A's. They assisted in lining holdings and gave advice on soil conservation measures, etc.

Bark rot.—Noted that the trials at Nivitigalakele indicated that bark rot in susceptible clones could be prevented by the application of a water-soluble disinfectant after every tapping.

The report was adopted.

(*b*) *Circulation of reports.*—Owing to the shortage of paper it was agreed that the draft Annual Report and Balance Sheet should only be circulated to members for perusal.

5. Accounts

(*a*) *Statement of Receipts and Payments of the Board for the 4th quarter 1943* — was adopted.

It was noted that the collections for the year would be below the estimate owing to shortfall of exports.

(*b*) *Dartonfield, Nivitigalakele and Hedigalla accounts for October and November, 1943* — were tabled.

(*c*) *Fixed deposits.*—Reported renewal of four fixed deposits amounting to Rs. 125,000.

(*d*) *Investments.*—Reported investment of Rs. 110,000 in Ceylon Government National Loan. Policy regarding future investments was revised to allow for a larger percentage of funds to be invested in long term securities.

(*e*) *Rates of subsistence allowance.*—It was agreed that the revised Government rates of subsistence and lodging allowances should be paid

to the staff with effect from 9th December, 1943; also that the subsistence allowance payable to members should remain the same as at present.

6. Staff

(*a*) *Dr. C. E. Ford.*—Reported that Dr. C. E. Ford, Geneticist, had been released from military service and had resumed duties on 14th January, 1944.

(*b*) *Junior Staff.*—Reported appointment of a Computer, 1 Temporary Chemical Laboratory Assistant (new appointments) and 1 Rubber Instructor (to fill an existing vacancy).

7. Hedigalla Cart Road

Agreed that tenders be invited for construction of the first stage of the road.

8. London Advisory Committee

Minutes of meetings of the Committee and the Technical Sub-Committee held on 24th September, 1943 were considered.

9. Capital Compensation Scheme

Agreed that the Research Scheme should withdraw from the Capital Compensation Scheme, but that tapping should be continued at the same intensity.

The meeting terminated with a vote of thanks to the Chair.

RUBBER RESEARCH SCHEME (CEYLON)

Minutes of the seventieth meeting of the Rubber Research Board held at the Galle Face Secretariat, Colombo, at 2·30 p.m. on Monday, 5th June, 1944.

Present.—Mr. L. J. de S. Seneviratne, C.C.S. (in the chair), Mr. C. E. Jones, C.C.S. (Deputy Financial Secretary), Mr. T. Amarasuriya, M.S.C., Mr. W. H. Attfield, the Hon'ble Mr. G. E. de Silva, M.S.C., Mr. W. P. H. Dias, J.P., Mr. F. H. Griffith, M.S.C., Mr. W. N. Gunawardena, J,P., Mr. R. J. Hartley, Mr. R. C. L. Notley, Mr. F. A. Obeyesekere, Mr. S. F. H. Perera, Mr. J. L. D. Peiris, Mr. G. R. Whitby, M.S.C., and Mr. E. W. Whitelaw,

Mr. T. E. H. O'Brien, Director, was present by invitation.

An apology for absence was received from Mr. L. P. Gapp.

1. Minutes

(*a*) *Confirmation.*—Draft minutes of the meeting held on 6th March, 1944, which had been circulated to members, were confirmed and signed by the Chairman.

(*b*) *Matters arising from the minutes.*

1. *Power supply at Nivitigalakele.*—Reported the arrangements made for the purchase of a 5 h.p. Ruston engine and pump.

2. *Investments.*—Policy regarding investment of funds in long-term securities was amended in accordance with the advice of the Treasury representative.

2. Experimental Committee

(*a*) Recommendations made at meeting held on 1st May, 1944:—

1. *Water supply at Dartonfield.*—Arrangements made for the purchase of a reciprocating pump and motor were approved.

2. *Excesses and savings on estate votes.* Votes totalling Rs. 8,956 were passed to cover over-expenditure in 1943 at Dartonfield, Nivitigalakele and Hedigalla.

3. *Budwood nursery.*—The proposals approved by the Committee for clearing part of the budwood nursery in order to make room for multiplying the new PB. clones, and for disposal of the surplus budwood, were noted.

4. *Dispenser.*—Agreed that a Dispenser-clerk be appointed to replace the present part-time Dispenser. Also that steps be taken to establish a school at Dartonfield with a school master who is able to teach both Sinhalese and Tamil.

5. *Spraying and dusting equipment for Geneticist.*—Purchase of a power sprayer and a small power duster for use in connection with pollination work was approved.

6. *Rubber testing equipment for Chemist.*—Purchase of equipment costing about £700 for work on selection for quality was approved.

7. *Ladder tapping trial.*—Agreed that a trial be laid down to study the effect on yield of extra tapping cuts above the normal panel. The appointment of an additional K.P. to supervise the trial was approved.

The minutes were adopted subject to the above comments.

(*b*) *Fatal accident to an estate employee.*—Reported with regret that a factory labourer had been fatally injured in an accident while employed in stoking the boiler.

3. Staff

(*a*) *Mr. M. W. Philpott's service agreement.*—Agreed that Mr. Philpott's agreement be extended for a further two years on the terms previously approved.

(*b*) *Overseas leave for senior officers.*—In view of the fact that several officers were now due for overseas leave the question of the time at which they should take their leave was considered. It was agreed that it would be in keeping with the Board's wishes if officers would avail themselves of their leave when opportunity occurs. It was also agreed that the Chairman should have discretion to grant short leave in India to officers for health reasons.

(*c*) *Junior staff salaries.*—Applications from several junior officers for improvement of their salaries and war allowances were referred to the Experimental Committee for report.

(*d*) *Laboratory Assistant (Chemical Department).*—Reported the appointment of Mr. K. I. Diaz with effect from 15th March, 1944.

4. Reports

Annual Report for 1943 and Director's report for the 1st quarter 1944 were approved.

5. Accounts

(*a*) *Balance Sheet and Income and Expenditure Account for 1943.*—The Chairman reported that the Auditor General's report had not yet been received. The accounts were approved subject to audit.

(*b*) *Over expenditure and savings on votes.*—A statement showing details of over-expenditure and savings on votes for 1943 was considered and supplementary votes of Rs. 11,339 on Revenue account and Rs. 1,632 on Capital account were passed to cover the over-expenditure.

(*c*) *Revotes of 1943 estimates.*—Unexpended balances of 1943 capital votes totalling Rs. 8,958 were re-voted and supplementary votes of Rs. 2,921 passed.

(*d*) *Dartonfield, Nivitigalakele and Hedigalla accounts for December, 1943,* were tabled.

(*e*) *Deposit in Ceylon Savings Bank.*—Reported that Rs. 3,000 had been deposited in the Ceylon Savings Bank.

(*f*) *Payment of overtime.*—Payment of overtime at the Director's discretion according to Government rates was approved.

6. London Advisory Committee

Minutes of special meetings of the Committee and Sub-Committee held on 16th November and 16th December, 1943 and 18th January, 1944 were adopted.

The meeting then terminated.

RUBBER RESEARCH SCHEME (CEYLON)

Minutes of the seventy-first meeting of the Rubber Research Board held in the Chamber of Commerce Building, Colombo, at 2-30 p.m. on Monday, 21st August, 1944.

Present.—Mr. L. J. de S. Seneviratne, C.C.S., (in the chair), Mr. C. E. Jones, C.C.S., (Deputy Financial Secretary), Mr. T. Amarasuriya, M.S.C., Mr. W. H. Attfield, Mr. W. P. H. Dias, J.P., Mr. L. P. Gapp, Mr. W. N. Gunawardena, J.P., Mr. R. J. Hartley, Mr. R. C. Kannangara, M.S.C., Mr. R. C. L. Notley, Mr. F. A. Obeyesekere, Mr. J. L. D. Peiris, Mr. G. R. Whitby, M.S.C. and Mr. E. W. Whitelaw.

Mr. T. E. H. O'Brien, Director, was present by invitation.

An apology for absence was received from Mr. S. F. H. Perera.

1. Minutes

(*a*) *Confirmation.*—Draft minutes of the meeting held on 5th June, 1944, which had been circulated to members, were confirmed and signed by the Chairman.

(*b*) *Matters arising from the minutes* :—

1. *Upward Tapping.*—Reported that the Rubber Commissioner had informed local rubber producers by means of a press notification that he would accept responsibility for any claims for patent infringement which may arise from the adoption of upward tapping.

2. *Overseas leave for senior officers*—Agreed that Mr. M. W. Philpott, Chemist, should pay a short visit to England partly on duty and partly on leave.

2. Memoranda on Future Development and Appointment of Research Assistants (Graduates)

These were referred to a Sub-Committee for consideration and report.

3. Experimental Committee

(*a*) Recommendations made at meeting held on 8th July, 1944 :—

1. *Salaries of junior staff and peons*—Revised salaries as recommended by the Committee were approved.

2. *Bonus to Estate Superintendent*—The recommendation that, in view of the good yields harvested in 1943, the Superintendent be paid a bonus of one month's salary was approved.

Reported that the prize offered by the Rubber Commissioner for the maximum crop increase from estates 25 to 100 acres in extent during 2nd quarter 1944 had been awarded to the Superintendent in respect of Nivitigalakele.

3. *Dispenser.*—Reported the appointment of Mr. A. J. Jayasinghe as Dispenser-Clerk with effect from 21st August, 1944.

4. *Planting programme for 1945.*—Agreed that there should be no new clearing at Hedigalla except :—

(a) Opening up about six acres of deniya land for paddy cultivation.

(b) Completion of the boundary strip above the present clearings.

It was noted that a small area at the entrance to Dartonfield was being prepared for paddy cultivation.

5. *Drying house for tapping samples.*—Noted that provision for a drying house for tapping samples would be made in the estimates for 1945. The immediate purchase of a hot water boiler for the purpose was approved.

The minutes were adopted subject to the above comments.

4. Accounts

(*a*) *Auditor's Report for 1943* — was adopted.

(*b*) *Receipts and Payments Account for the 1st quarter 1944* — was approved.

(*c*) *Dartonfield, Nivitigalakele and Hedigalla accounts January to March 1944* — were tabled.

(*d*) *Investments and Fixed Deposits* — Reported :—

1. Transfer of a fixed deposit of Rs. 20,000 to current account on maturity of the deposit.
2. Investment of Rs. 60,000 in 3¼ per cent National Loan 1956.

Agreed that a further Rs. 50,000, which was now available for investment, should be invested in 2½ per cent Ceylon Government War Loan 1954.

(*e*) *Supplementary Votes.*—Supplementary votes amounting to Rs. 19,763 on Revenue Account and Rs. 20,265 on capital account were passed.

5. Staff

(*a*) *Director.*—Reported that Mr. T. E. H. O'Brien, Director, had been granted one month's leave from 26th August, 1944. Mr. M. W. Philpott, Chemist, would be in charge of the Scheme's work during this period.

(*b*) *Service Agreements.*—Reported that the new service agreements of Messrs. W. I. Pieris, C. A. de Silva and C. E. Ford would be signed after the meeting.

(*c*) *Junior Staff.*—Reported the appointment of Mr. T. S. J. Peiris as Typist-Clerk (Head Office) with effect from 10th July, 1944.

6. London Advisory Committee

(*a*) *Contribution for 1945.*—Agreed that the contribution for 1945 should be on the same basis as for 1943 and 1944.

(*b*) *Report for 1943* — was adopted.

7. Publications

The following publications were tabled :—

1. *Combined Quarterly Circulars for 1943.*
2. Advisory Circulars No. 21 and 22.
3. Advisory Circular No. 20. (Revised May, 1944).
4. Advisory Circular No. 3. (Revised September, 1943).
5. Handbook on preparation of plantation rubber in Ceylon. (Revised 1943).

The meeting terminated with votes of thanks to the Chair and to the Chamber of Commerce.

RUBBER RESEARCH SCHEME (CEYLON)

Minutes of the seventy-second meeting of the Rubber Research Board held at the Secretariat, Colombo, at 2-30 p.m. on Monday, 23rd October, 1944.

Present.—Mr. L. J. de S. Seneviratne, C.C.S. (in the chair), Mr. T. Amarasuriya, M.S.C., Mr. W. H. Attfield, the Hon. Mr. G. E. de Silva, M.S.C., Mr. W. P. H. Dias, J.P., Mr. L. P. Gapp, Mr. F. H. Griffith,

M.S.C., Mr. W. N. Gunawardena, J.P., Mr. R. J. Hartley, Mr. R. C. Kannangara, M.S.C., Mr. R. C. L. Notley, Mr. F. A. Obeyesekere and Mr. J. L. D. Peiris.

Mr. T. E. H. O'Brien, Director, was present by invitation.

Apologies for absence were received from Messrs. C. E. Jones, C.C.S. (Deputy Financial Secretary), G. R. Whitby, M.S.C., and E. W. Whitelaw.

1. Minutes

Draft minutes of the meeting held on 21st August, 1944, which had been circulated to members, were confirmed and signed by the Chairman.

2. Experimental Committee

Recommendations made at meeting held on 23rd October, 1944 :—

The Chairman of the Committee reported that there had been no quorum for the meeting, but the members present had agreed to make the following recommendations :—

(*a*) *Well for junior staff* —The recommendation that a supplementary vote of Rs. 800 be passed for the construction of a well for the junior staff was approved.

(*b*) *Visiting Agent's Report on Hedigalla* —The recommendation that in the present state of development of Hedigalla it was unnecessary for the V. A. to pay more than one visit per year was approved.

3. Directors Report for the 2nd Quarter 1944

This was approved.

4. Accounts

(*a*) *Statement of Receipts and Payments for the 2nd quarter 1944* — was approved.

(*b*) *Dartonfield, Nivitigalakele and Hedigalla accounts April to July, 1944* — were tabled.

(*c*) *Estimates of income and expenditure for 1945.*—Estimates of income and expenditure for 1945 were approved as follows :—

Income		Rs. 364,203
Expenditure :—		
Revenue	Rs. 340,967	
Capital	„ 71,264	„ 412,231

(*d*) *Investments.*—The Chairman reported the investment of Rs. 50,000 in Ceylon Government 2½ per cent War Loan 1954, on 7th September, 1944

(*e*) *Inventory Report for 1943* — was adopted.

5. Staff

(*a*) *Mr. C. C. T. Sharp.* —The Chairman reported that Mr. C. C. T. Sharp, Botanist, had returned from leave on 26th September.

(*b*) *Mr. M. W. Philpott.*—The Chairman reported that Mr. M. W. Philpott, Chemist, had left on four months leave, by air, on 8th October.

Appointments — Reported that :—

(a) Mr. S. Ramachandran had been appointed Analyst (Soils Dept.) with effect from 14th September, 1944, at an initial salary of Rs. 75 on the approved scale.

(b) Mr. D. S. Muthukude had been appointed Laboratory Assistant (Chemical) with effect from 1st September, 1944, on the approved scale.

6. Brown Bast

Replying to questions asked by a member regarding the incidence and treatment of Brown Bast, the Director gave particulars of the work being carried out by the research staff. It was agreed that a short Advisory Circular should be prepared.

7. Publications

It was agreed that the memorandum entitled "The Technique of Sulphur Dusting" should be printed as a supplement to Advisory Circular No. 22 and issued to those on the publications register.

The meeting then terminated.

RUBBER RESEARCH SCHEME (CEYLON)

Minutes of the seventy-third meeting of the Rubber Research Board held at the Secretariat, Colombo, at 2-30 p.m. on Monday, 18th December, 1944.

Present.—Mr. L. J. de S. Seneviratne, C.C.S. (in the chair), Mr. C. E. Jones, C.C.S. (Deputy Financial Secretary), Mr. T. Amarasuriya, M.S.C., Mr. W. H. Attfield, Mr. W. P. H. Dias, J.P., Mr. L. P. Gapp, Mr. F. H. Griffith, M.S.C., Mr. W. N. Gunawardena, J.P., Mr. R. J. Hartley, Mr. R. C. Kannangara, M.S.C., Mr. R. C. L. Notley, Mr. F. A. Obeyesekere. Mr. J. L. D. Peiris, Mr. G. R. Whitby, M.S.C., and Mr. E. W. Whitelaw.

Mr. T. E. H. O'Brien, Director was present by invitation.

An apology for absence was received from Mr. S. F. H. Perera.

1. Minutes

Draft minutes of the meeting held on 23rd October, 1944, which had been circulated to members, were confirmed and signed by the Chairman.

2. Board

The Chairman reported that Mr. E. W. Whitelaw had been re-nominated to serve on the Board as a representative of the Rubber Growers' Association for a period of three years from 14th December, 1944.

3. Director's Report for the 3rd Quarter 1944

This was adopted.

4. Report of the Development Committee

Mycologist.—Agreed that a Mycologist be appointed on the approved salary scale.

The Committee's report was considered and adopted subject to minor amendments. It was agreed that a memorandum embodying the proposals should be printed for issue as a special circular, and that the various associations representing planting interests should be asked to consider the proposals and express their views.

5. Experimental Committee

(*a*) *Membership.*—Mr. S. F. H. Perera's resignation from the Committee was reported and Mr. R. C. L. Notley elected in his place.

(*b*) *Recommendations made at meeting held on 27th November, 1944* :—

1. *Cattle grazing experiment.*—Agreed that an experiment, as outlined by the Soil Chemist, be undertaken to study the effects of cattle grazing under mature Rubber.

2. *Malaria Control Scheme.*—Agreed that the Research Scheme should subscribe to the scheme to appoint a supervisor of streams.

The minutes were adopted subject to the above comments.

6. Smallholdings Committee

Minutes of the meeting held on 27th November, 1944 were adopted subject to certain comments.

7. Accounts

(*a*) *Statement of Receipts and Payments of the Board for the 3rd quarter 1944* — was approved.

(*b*) *Dartonfield, Nivitigalakele and Hedigalla accounts for August and September, 1944* — were tabled.

(*c*) *Fixed deposits and investments* — Reported :—

1. Transfer of a fixed deposit of Rs. 20,000 to current account.
2. Renewal of a fixed deposit of Rs. 10,000.
3. Investment of Rs. 15,000 in 3 per cent Defence Loan.

Reported that three fixed deposits amounting to Rs. 115,000 were due to mature shortly. It was agreed that they should be recalled and invested on the advice of the Treasury representative.

8. Staff

Junior Staff.—Reported the resignation of Mr. L. Weerasinha, Computer, on 25th November, 1944.

9. London Advisory Committee

(*a*) *Contributions 1943-45.*—Agreed to payment of increased contributions towards the expenditure of the Committee for the three years 1943-45 on the basis of a revised statement of expenditure for the three years.

(*b*) *Minutes of the Committee and the Technical Sub-Committee held on 30th June, 1944* — were adopted.

The meeting terminated with a vote of thanks to the Chair.

London Advisory Committee for Rubber Research (Ceylon and Malaya).

Member nominated by the Colonial Advisory Council of Agriculture and Animal Health:

Dr. H. A. Tempany, C.B.E.

Member nominated by the Government of Ceylon:

Mr. L. Lord

Member nominated by the Governments in British Malaya:

Mr. J. Lornie, C.M.G.

Members representing Malayan planting interests—nominated by the Rubber Growers' Association:

Mr. P. J. Burgess (Chairman).
Mr. J. L. Milne.
Mr. Eric Macfadyen.

Members representing Ceylon planting interests—nominated by the Rubber Growers' Association:

Mr. G. H. Masefield.
Mr. George Brown
Mr. H. W. Horner.

Member representing Manufacturing interests:

Lieutenant-Colonel J. Sealy-Clarke.

Ex-Officio Members:

Sir H. A. F. Lindsay, K.C.I.E., C.B.E., Director of the Imperial Institute.
Professor V. H. Blackman, Director of the Botanical Laboratories, Imperial College of Science and Technology.
Dr. S. P. Wiltshire, Director of the Imperial Mycological Institute.
Dr. W. G. Ogg, Director of the Rothamsted Experimental Station.

Secretary:

Mr. J. J. Endcox (Acting)

The Technical Sub-Committee consists of members of the Advisory Committee with the following co-opted Members:

Mr. G. Martin (Superintendent of Rubber Investigations).
Mr. G. E. Coombs.
Mr. G. G. Balazs.
Dr. Samuel Pickles
Dr. H. P. Stevens
Dr. D. F. Twiss
Prof. R. G. H. Clements

STAFF.

Mr. G. Martin, B.Sc., A.R.I.C., F.I.R.I.
Mr. H. C. Baker M.Sc., A.R.I.C., A.I.R.I.
Mr. W. G. Wren, B.Sc., A.R.C.S.

RUBBER RESEARCH SCHEME (CEYLON)

LIST OF PUBLICATIONS FOR SALE

Bulletins No. 1-20 .Bound volume, Rs. 5 00. Later Bulletins Re.1 00 per copy

No. 1. The Effect of Tapping on the Movements of Plant-Food in *Hevea Braziliensis*

No. 2. The Effect of Tapping on the Movements of Plant-Food in *Hevea Braziliensis*

No. 3. Seasonal Variations in the Movements of Plant-Food in *Hevea Braziliensis*, Part I.

No. 4. The Physiological Effects of Various Tapping Systems, Part I.

No. 5 Progress Report on Vulcanization Tests.

No. 6. The Physiological Effects of Various Tapping Systems, Part II.

No. 7. The Physiological Effects of Various Tapping Systems, Part III.

No. 8. Seasonal Variations in the Movements of Plant-Food in *Hevea Braziliensis*, Part II.

No. 9. Vulcanization Tests.

No. 10. Vulcanization Tests.

No. 11. Variability in Rubber Manufacture

No. 12. Progress Report of the Rubber Research Chemist.

No. 13. Vulcanization Tests.

No. 14. On the Variation in the Number of Latex Vessels present in *Hevea Braziliensis*

No. 15. Vulcanization Tests.

No. 16. On the Natural Clotting of Rubber Latex

No. 17. Vulcanization Tests.

No. 18. Measurements of "Bark Renewal"

No. 19. Vulcanization Tests

No. 20. Vulcanization Tests

No. 21. Vulcanization Tests 1919

No. 22. Vulcanization Tests 1919

No. 23. Vulcanization Tests 1920

No. 24. Valcanization Tests 1920

No. 25. Investigations on Samples of Plantation Para Rubber from Ceylon. 1921

No. 26. Result of Trials of Ceylon Plantation Rubber for the Manufacture of Ebonite 1921

No. 27. Investigations on Samples of Plantation Para Rubber from Ceylon. 1921 (out of print)

No. 28. Investigations on Samples of Plantation Para Rubber from Ceylon. 1922

No. 29. Summary of the Principal Results Obtained from Investigations into the Properties of Ceylon Plantation Rubber in Relation to its Method of Preparation. 1922

No. 30. The Penetration of Disinfectant on the Tapping Cut of *Hevea Braziliensis* 1922 (out of print)

No. 31. On the Occurrence "of Rust" on Sheet Rubber. 1923

No. 32. On the Preservation of Latex. 1924

No. 33. Investigations on Samples of Plantation Para Rubber from Ceylon. 1924

No. 34. Investigations on Samples of Plantation Para Rubber from Ceylon. 1924

No. 35. Investigations on Samples of Plantation Para Rubber from Ceylon. 1924

No. 36. Investigations on Samples of Plantation Para Rubber from Ceylon. 1924

No. 37. Investigations on Samples of Plantation Para Rubber from Ceylon 1924

No. 38. Investigations on Samples of Plantation Para Rubber from Ceylon. 1925

No. 39 Do (Final Report Series I) 1925

No. 40. Do Series II 1926

No. 41. Do First Interim Report on Artificial Ageing Tests 1926

No. 42. On the Smoking of Sheet Rubber in Relation to Mould Prevention. 1926

No. 43. The Inter-Relationship of Yield and the Various Vegetative Characters in *Hevea Braziliensis* (out of print). 1926

No. 44. The Construction of Smokehouses for Small Rubber Estates (out of date) 1926

No. 45. The Efficiency of Disinfectants and Fungicides. 1927

No. 46. The Control of Bark Rot by Disinfectants. 1927

No. 47. Report on Variability of Ceylon Estate Grades 1927

No. 48. Brown Bast and its Treatment. (out of print) 1928

No. 49. Report on Causes of Variation in Plasticity. 1928

No. 50. Crepe Rolling. 1929

No. 51. The Curing of Sheet Rubber. 1930

No. 52. The Preparation of Uniform Rubber. 1932

No. 53. Oidium Leaf Disease 1936

No. 54. Report on a Visit to Malaya, Java and Sumatra. 1937

Hand books at Rs. 2-50 per copy.

The Preparation of Plantation Rubber.

The Budding of Rubber. By R. A. Taylor, B.Sc., Physiological Botanist (out of date)

Diseases of Rubber in Ceylon. By R. K. S. Murray, A.R.C.Sc., Mycologist.